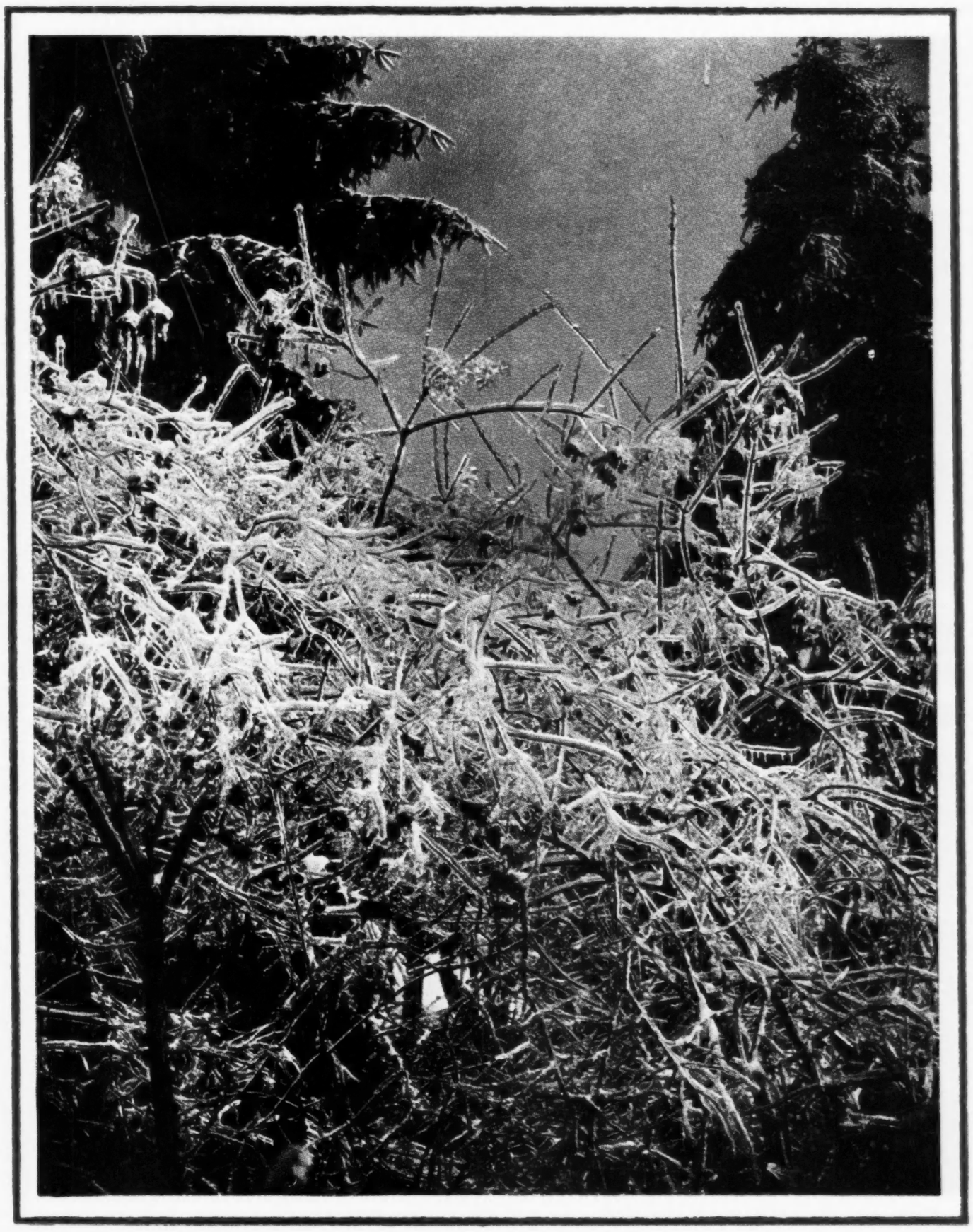
The Garden Journal

of the New York Botanical Garden



Vol. I, No. 1 Jan.-Feb., 1951

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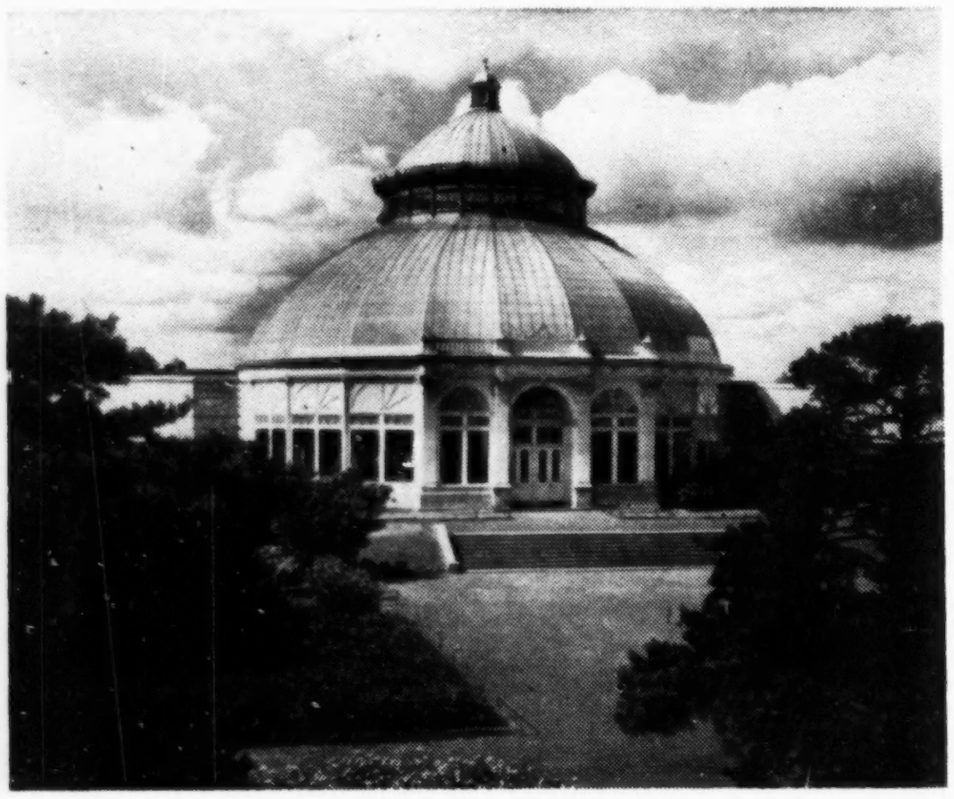

MID-WINTER DISPLAYS
In The Conservatory

January 27, 1951, in House No. 4. Winter Flower Garden — an exhibit of "cool" greenhouse material and flowering shrubs.

February 22, 1951, in House No. 4. Holland Bulb Garden — a bit of Holland in tulip time.

DOROTHY EBEL HANSELL
Editor

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AMONG OUR CONTRIBUTORS

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CREDIT FOR ILLUSTRATIONS

Front cover, design, Eduardo A. Salgado, kodachrome of an ice-covered high-bush cranberry, John P. Roche; illustrations on page 2, E. N. Mitchell; page 5, U. S. Geological Survey; pages 7 and 8, J. Fred Spalding; page 9, British Columbia Government Travel Bureau; pages 10 and 11, John P. Roche; page 13, William Drescher; page 15, Stagg Supply Co., Beaumont, Texas; pages 16 and 17, Kennedy & Co.; page 22, U. S. Steel Corporation; page 23, E. N. Mitchell; page 24, drawing by Mrs. Donald P. Rogers; pages 26 and 28, drawings by Eduardo A. Salgado; back cover, photo by E. N. Mtichell.

The Garden Journal of The New York Botanical is published bi-monthly by The New York Botanical Garden, Bronx Park, New York 58, N. Y. Printed in U. S. A. Entered as Second Class Matter, January 28, 1936, at the Post Office at New York, N. Y., under the Act of August 24, 1912. Annual subscription $2.00. Single copies 35 cents.

TODAY'S WINDOW GARDEN

By Jean Hersey

WINDOW gardening is for everyone — from six to sixteen to sixty. If you are little and six and like to see things grow in a hurry, you can sprout bean seeds around the inside edges of dirt-filled tumblers, grow grass seed in a sponge, or alyssum in colored Easter eggs. If you are sixteen and like parties, you can raise orchids for your dates and gardenias for your hair; or if you are of the opposite sex, you may prefer lemons, kumquats, and a special kind of indoor fig in your window. And if you are sixty, you will like everything — a small desert of flowering cacti, a terrarium where a diminutive world, glass-enclosed, flourishes for months on end with no care at all, or half a dozen fragrant herbs which will spread their scent through your living room and their flavor through your dinner.

A single row of potted plants on the window sill can be simple and lovely, but with imagination in arrangement and planning the modern window garden needn't stop there. It can be a real garden, small in size, but a place of lush growth where vines trail up, ferns spill feathery foliage, and blossoms spread a riot of color and fragrance. Today's window garden promises to provide excitement and fun with something forever happening — and the sky's the limit!

The first thing to consider in raising plants indoors is the matter of humidity, and how to increase it. The atmosphere in most houses and apartments today is too arid. The first step is a tray of pebbles and water to fit your sill. Here the pots sit raised above the water level. With perpetually evaporating moisture around the foliage, the air is fresh and clean, and the whole garden flourishes in a state of great good health. To increase humidity still further, keep handy a bulb sprayer filled with clear water. Sprinkle the plant tops daily. How they sparkle and glow after this home-made rain! The pebble tray beneath the pots, incidentally, keeps the water from deluging the floor and the rug.

With the pebble tray as foundation, you can compose an interesting arrangement of plants. By raising some on upturned pots, and lowering others, you can design a pleasing pattern. Follow the general rules for composition in painting, choose a major center of interest (a plant of brilliant color in foliage or flower, or perhaps unusual leaf pattern) and a minor center of interest. Have lines (trailing vines or branches) that lead your eye from here to there, up and around, but never off at a sharp angle out of the garden. Once you start working with these principles, a mere row of pots with no particular plan or pattern seems dull.

A FEW additional and special kindnesses that you can do your window garden include shining a hundred watt bulb from a bridge lamp on the foliage for a few hours daily after dark. This attention costs but a few cents a week, and stirs everything into vigorous growth and bloom. Favor number two — get a great crock and fill it with rain water or melted snow, with the cooperation of the weather, and use this for watering. Store the crock where the water will remain at room temperature. City water supplies often abound in purifying chemicals that while healthy for humans and not fatal to plants, are still not as beneficent as rain water. Plant food every week or so also brings visible and wonderful results. The easiest kind to manage is any one of the plant tablets on the market. They may be diluted in water or shoved into the soil.

Keep indoor plants well groomed. Frequently scrub off the outside of the pot to permit the roots to breathe as well as take in moisture through the crockery wall. Trim all dead leaves and keep the plants pruned into appealing shapes, ruthlessly shearing off all scrag as it develops.

The best rule to follow on watering is to sprinkle the foliage daily with the bulb sprayer, using clear room-temperature rain water, and for most varieties let the earth dry out thoroughly between pot waterings, then soak till water runs out the bottom. Many plants want water daily, others less often. This is all part of the very minimum care which a window garden requires. A very few minutes daily will keep it in fine form — and what a joy those few minutes are! When you go to water the garden in the morning, give it a whiff of fresh air, not a blast of icy wind directly on the plants, but air from across the room.

Something will grow in every indoor location where there is light. Occasionally people ask what they can raise in a dim corner of an apartment with no window and no light. My answer is usually, "That will be the place to show off your favorite still life (with a good light on it), your collection of china or shells. But not living plants". With sun, you can grow and flower myriads of plants. With light and no sun, you can still do very well, but with neither you are out of luck.

Among the material that will grow rapidly in a north window are ivies, any kind of terrariums, and African violets. Consider your location and

select plants that approve of the amount of light and sun, whatever it is, and you are off to a good start. There are so many hundreds of plants from which to select that one scarcely knows where to begin, but I shall mention a few that are in our window garden at the moment.

Ours is a southern exposure with five hours of sun daily. Pebble trays support the pots, some of which are

raised and some not. From a shelf midway across the window vines climb up and trail down.

When the sun shines, one of the gayest plants in our window is one with never a flower—blood leaf or iresine. The fleshy branches, as well as the leaves, are a vibrant crimson. The entire plant is translucent in sunlight, and so stirringly bright that it brings the whole room to life. Iresine is one of the easiest of all to propagate. Snip off a three-inch sprig anywhere from the plant, and pot it in regular soil. Within three weeks or so, new little leaves will unfold.

Another of our favorites is the Norfolk Island pine (*Araucaria excelsa*) which grows one to two feet indoors. From a central stem tiers of regular branches appear at intervals — all furred with needles. This is one of the prettiest of all indoor plants to look at. It is also one of the pleasantest to touch. Sometimes we get so involved in gazing at the plants in our window and smelling their fragrance, all of which is undeniably nice, that we forget what joy there also is in the feel of flowers and greenery. For a purely delightful sensation, run your hand over the Norfolk Island pine branches.

Equally pleasant to touch as well as to grow are ferns. The bird's nest (*Asplenium Nidus*) has a smooth shiny leaf; the Boston has feathery foliage.

One of our favorite plants of all times and as appealing to stroke as a small kitten, is the sea onion (*Ornithogalum caudatum*). Not only is this the easiest of indoor plants to grow, but it has the most unusual appearance and habits. The pale green onion-like bulb grows two-thirds out of the pot soil. From its top shiny, ribbon-like leaves rise and in a graceful arch curve down.

Left: The kangaroo vine.

Below: The fairy primrose.

Lower right: The Norfolk Island pine

Cut short they curl into ringlets; left long they trail two or three feet. Starry white blooms appear on a long twisting stalk the year round. At intervals, the sea onion sheds its skin to reveal a small cluster of bulblets which fall to the surrounding soil and commence to grow. Nor is this all. In Switzerland, the country people crush the leaves and use the juice as counter-irritant for cuts, bruises and sprains.

Three other plants which we like very well are the fan iris (*Neomarica Northiana*) with sword-shaped foliage and flowers like a cross between an orchid and an iris; fairy primrose (*Primula obconica*) with blue, red, or white blossoms; and kangaroo vine (*Cissus antarctica*) which grows in sun or shade, heat or coolness, and never succumbs to a bug or a blight.

An exciting bit of news in recent horticulture is that one can raise orchids in the house. Certain kinds will grow and flower in a window among the other plants, if you give them a little extra foliage spray. *Coelogyne cristata* is one of these amiable aristocrats. Not only are they lovely to look at, but the wax-like white blossoms are produced from January to March. Other orchids will thrive in an orchid case (you can either buy or make it) which provides the necessary humidity.

If you can acquire any empty aquarium, large or small, round or square, you can create your own terrarium. Gather woods material (red-tipped lichen, ferns, mosses) and arrange them within in a harmonious design. Leafmold on upturned moss in the bottom starts you off. All winter this grows green through the glass. With cellophane or a piece of glass fitting snugly over the top, this small green world thrives on its own atmosphere. There on your table or window you possess one small enclosed garden which smells like the tropics—and no fragrance is more wonderful on a cold and snowy winter day. Just lift the top and take a deep breath.

Mr. Emerson says, "That which builds is better than that which is built." And so it is with a window garden. Keep it building, keep it fresh and exciting with different arrangements, with new plants and projects. Try whatever arouses your curiosity, even if you aren't sure what it will do. Loose your imagination and sense of adventure, and the garden in your window will never be a dull static affair. From the tumbling of the last autumn leaf to the arrival of the first crocus, and into summer it will be a never-ending source of growing delight.

Kalalau Valley

Island Of Kauai, Hawaii

By Otto Degener

THE Hawaiian Islands, because of their great geologic age and their readily eroding lavas, are in many places chiseled out into deep amphitheater-like valleys bounded by knife-edge ridges. I fear I may slip off one of these ridges — it happens to some one careless hiker almost annually — injure myself and find myself helpless and forelorn. Hence, I never go botanizing alone. So when last January a congenial group of University of Hawaii instructors invited me to tour Kauai with them, the most western of the major islands of the Hawaiian Archipelago, I eagerly joined them.

We left Honololu, Island of Oahu, by an Hawaiian Airlines plane, reaching Lihue, Kauai, about an hour later. There we rented a U-Drive car for a reasonable sum and drove to the wharf at Port Allen to pick up a jeep belonging to one of our party. Then we split up into two groups, each varying from day to day in membership and size. One group, including myself, always went botanizing; while another might visit Waipahee to slide down the flume-like waterfall to a deep swimming pool below, or visit the fascinating old missionary house built in New England style in 1836 near the shore of beautiful Hanalei Bay.

Each of the ten days spent on Kauai was replete with interesting experiences, even for an old-timer, or *kamaaina,* like myself who first visited here in 1922 in the good ship Likè-Likè and was rowed ashore in a whaleboat to diminutive Nawiliwili wharf. But the experiences I shall impart now involve only Kalalau Valley and vicinity.

As I had botanized along the northern Napali coast before, this time I concentrated on collecting plants *mauka,* or mountainward, of Hanalei with Bill Hatheway, formerly resident of Litchfield, Connecticut. While Bill and I discovered a new variety of *Lycopodium,* or groundpine, growing on the trunk of a venerable feral mango tree, the others hiked along the safe Napali trail that threads its way in and around numerous, magnificently beautiful gulches and cliffs. When they approached the mouth of Kalalau Valley, they spied one of the strangest of Hawaiian plants, aptly described as resembling a cabbage stuck on a telephone pole. It is *Brighamia,* an endemic lobelia, curiously enough growing on almost inaccessible ledges and cliffs subject to the full force of the salty ocean wind. Its single, thick stem and fleshy leaves at once identify it as a xerophyte or halophyte, a plant loving or at least tolerating unusual dryness or saltiness. I had collected this same type of plant in 1938 for the herbarium of The New York Botanical Garden on the spray-drenched cliffs of windward Molokai.

LATER, we moved our headquarters to the Forest Reserve at Kokee. Here, we rented for a couple of dollars per person a spic-and-span cabin furnished with linen, cutlery, electricity, and hot and cold running water. It is maintained by the Territorial Board of Agriculture and Forestry for hunters and other vacationers. Equipped with plant press, camera, knapsack, picnic lunch and a stout rope in case of an emergency, we drove to Kalalau Lookout on January 31. On the way we passed a lobelia surpassing in height most of the neighboring forest trees. It consisted of a single unbranched forty-foot stem, topped by a cluster of linear leaves. This proved to be *Cyanea leptostegia.*

Farther on we spied some chickens scratching away for their breakfast along the side of the road. As we drove nearer, they became attentive and surprised us by suddenly flying away over the tallest trees. These wild chickens, or at least their forebears, were introduced some years past by the Board of Agriculture and Forestry from New Guinea. They are now crossing with the few Hawaiian chickens still existing and introduced to these islands by the ancient Polynesians, true vikings of the sunrise, some thousand years ago. The presence of such chickens, and of certain Old World food plants in the Hawaiian Islands before their Caucasian discovery in 1778, is conclusive proof that this talented race had its origin in the East, perhaps in India, rather than in the New World.

Parking the car near the Lookout, we saw magnificent Kalalau Valley, fringed on three sides by *na pali,* or cliffs, 4,000 feet below us. We reveled in the view, particularly in seeing the gulches near sea level filled with a trickle of light green *kukui,* or candlenut trees, against sombre surroundings. The cliffs are clothed with vegetation peculiar to them and, unless growing near their top or base, this vegetation is beyond reach of the botanist. Many a frustrating hour have I spent pelting a rare plant with sticks and stones in a vain effort to dislodge it from its inaccessible perch and to add it to the magnificent collection of Hawaiian herbarium specimens now lodged at The New York Botanical Garden and its Hawaiian sister institution, named in honor of Princess Bernice Pauahi Bishop.

Some of the conspicuous plants at the edge of the precipice were lobelias with yucca-like clusters of blue flowers, a remarkable composite named for Commander Wilkes of the U. S. Exploring Expedition, a *Pritchardia* or loulu palm, whose method of seed dispersal without mammalian aid in a hitherto mammal-free archipelago is still a mystery to me, and a new kind of euphorbia awaiting description by Dr. E. E. Sherff, of Chicago, and myself.

Farther back from the windswept precipice, in dark jungly woods, I rediscovered my pet beggartick, *Bidens cosmoides,* of the monotypic Section *Degeneria.* In my *Flora Hawaiiensis,* I do not do it justice as the illustration was drawn from a poorly pressed herbarium specimen. In life, the long side-branches of this beggartick extend horizontally for as much as ten feet through the dark, jungly rain-forest. At the tip of such a side branch hangs a single, open flower-head, not limply, but horizontally and gracefully upside down to cater to the visit of hovering insects. These flower-heads remind me of miniature, golden sunflowers and almost span the width of my hand. They are a beautiful and unexpected sight in the forest.

THERE are, unfortunately, some fundamentally evil plant tragedies transpiring at Kokee. Well-meaning amateur nature lovers and overzealous, ill-trained foresters of former Board administrations have set out weed trees and other botanical rubbish in a forest that otherwise would consist 100 per cent of endemic Hawaiian plants, plants found no other place on earth. Such weed trees and impenetrable jungles of the mainland blackberry (*Rubus penetrans*) are helping to exterminate our unique flora. It is sickening to a botanist to hear local people proudly ask "Have you seen our nasturtium jungle?" How can any one in his right mind be proud that the introduced nasturtium, which can be found in just about any mainland garden, is smothering out in this gulch our unique begonia of the endemic genus *Hillebrandia,* our lovely foliage plants of the genus *Cyrtandra,* our puzzling fern *Diellia,* and similar treasures?

What will keep the blackberry and nasturtium from further expanding their territories? There is grave danger that such mainland weeds, unless chopped down, dug out or sprayed with poison, will doom many of our natives to extinction. It is because I am convinced that most of our strange Hawaiian plants will go the way of the dodo, passenger pigeon and American chestnut, that I botanize so avidly. The next best thing, I am sad to relate, to a live Hawaiian plant growing in its native habitat, is a dead one properly labeled and available for study for all time in the Britton Herbarium at The Garden. In a sense, I am now actually preserving living fossils for study by botanists of the future.

But let us return to Kalalau Valley: Bill and I decided to walk along the valley's western rim toward the sea. By doing so, we thought, we would get out of the rain-forest at 4,000 feet to a drier forest and eventually to the cliffs overlooking the ocean. Thus, by passing through different ecological areas we should find many different kinds of plants. This proved correct. As we progressed northward we got into a drier forest consisting of a citrus relative (*Fagara dipetala*) with two pairs of united petals and with leaves of five leaflets of which the lowest two are but tiny vestigial auricles. This plant, of course, deserves to be placed in a genus of its own. Then we came across the endemic acacia known as *koa* by the native. It was parasitized here and there by a Hawaiian mistletoe of the genus *Korthalsella.* Later, we passed through sandalwood trees with yellowish flowers that wilt red, and tangles of staghorn fern (*Dicranopteris*).

As the intertwined wiry staghorn impeded our progress on the narrow plateau, we were forced to the precipitous edge of Kalalau. From that vantage point, Bill and I saw several dark clouds drift into the valley below us. As one passed, we were astonished to see two "Spectres of the Brocken". One was waving his arms when Bill waved his, and the other was just as stationary as I. We did not realize the bright sun was shining back of us, throwing our shadows on top of the cloud.

EAGER to continue our botanical explorations, we proceeded *makai,* or seaward, along the valley rim. Soon foreign grasses and weeds predominated, and neighboring Honopu Valley crowded toward us. By the time we had descended to an elevation of 3,500 feet or so near Nianiau, we were precariously balancing on a knife-edge, seemingly formed by two precipices leaning against each other. Lacking Bill's courage to go on, I sat down and viewed the unusual panorama below. To my right, or eastward, was Kalalau Valley, with a clump of naturalized sisal plants growing at the bottom; to the north, *makai,* the blue ocean flecked with clouds. To my left was Honopu, its precipitously sloping sides, covered with shrubs and grasses, extending 2,500 feet or more down to a tiny stream. And just below us, about half way down, was a herd of feral goats helping in the destruction of plants still new to science.

With field glasses we saw some botanical oddities, one a shrub with beautifully canescent leaves. Perhaps it is a new amaranth of the genus *Nototrichium* — thus far no one knows. About ten feet below us, among some rock outcrops, grew a small shrub with whitish flowers belonging to the genus *Kadua* or *Hedyotis,* to which our common bluets of the East are closely related. I had never seen this species before, though it does remind me of a plant belonging to the same genus growing on the inland cliffs of the Waianae Range of Oahu. I wanted it badly and Bill Hatheway, with an improvised hook tied to his rope, after many vain attempts, finally snared it and drew it up to us.

After describing and illustrating this cliff-dwelling plant, it will be sent to The New York Botanical Garden to repose in the herbarium. Few students of the plant will ever realize the thrill Bill and I had in its capture. I wonder how many experiences, pleasant, unpleasant and even deadly dangerous, are associated with the hundreds of thousands of plants collected by botanists throughout the world for deposit in the cases of our Museum Building. If those plants could talk!

Dr. H. A. Gleason, who is vacationing in California and subsequently will enjoy the pleasures of his place in Cos Cob, Conn., now that he has retired after serving The New York Botanical Garden in various capacities for thirty-one years, likes to tell this story about one of his professors. Having achieved both the age and the savings requisite to retirement, the professor set out to find the world's most pleasant spot in which to spend the years left to him. As a student he had found life in Jena most agreable, and so he revisited that university town. Then having read the tourist literature, he spent a season in Florida, and after that a season in California. Finding none of them up to his expectations, he visited Hawaii — and there was no need to look further.

Magnificent Kalalau Valley is fringed on three sides by cliffs; the gulches near sea level are filled with candlenut trees.

Seeds

And Their Germination

PART I

By Frank C. MacKeever

HOLD any seed in the palm of your hand, and you hold within your grasp "the Mystery of Life." Because you are conscious of this great mystery, many questions arise in your mind concerning it. For example:

What takes place within this seemingly lifeless object that causes it to commence growth, to pass through a life-cycle as a plant, to reach its ultimate goal of producing seeds in its own image? What are the governing factors required to promote germination — this growth? From what plant, of some 150,000 different flowering plants, did this seed come?

You may be able to answer some of these questions, or to find out the answers for yourself. But for the answers to other questions, you may have to turn to specialists in one or another of the departments of botany.

From their vast storehouse of knowledge and experience, you will acquire the information you seek about this seed, and what is required to make it function. They understand its external and internal structure, how it is assembled, its physical nature, and what it is composed of chemically. They are able to break it down into its minute, individual cells; they know about the construction, composition and operation of these cells.

Yet—if every one of these specialists the world over were brought together as one group, and as a group consented to pool their vast knowledge and abilities as scientists and technicians, in order to answer this question which you were about to put to them: "Gentlemen, is it possible for you to make a seed comparable to the seed in the palm of my hand — a seed that will germinate?" their answer would be "No."

There lies "the Mystery of Life".

What, then, is a seed? There are numerous definitions but I like to think of a seed as being an embryo—a miniature, complete, dormant plant. Picture, then, a towering sequoia with its great root system contracted into its seed form — something smaller than the seed of a sweet-pea.

In reality, seeds are ripened ovules resulting from either self pollination or cross pollination, within the ovary of a flower. Each seed contains an embryo which has one or more seed leaves known as cotyledons; a bud, or growing point, which is the plumule and contains the rudimentary stem with its attached leaves, and eventually the flower parts; and a short descending stemlet, the caulicle, the tip or lower portion of which is known as the radicle and from which the roots develop.

It may be of interest to go a step further and learn that the ovule, or ovules, are contained in the flower part known as the ovary. When the ovary is ripened, it then becomes the seed case or pericarp. Thus, botanically speaking, the ripened ovary is called the fruit, and it may have other flower parts amalgamated with it.

THIS statement may cause you to ponder — and to ask another question: "Take, as examples, a walnut, a watermelon, the winged keys of maples, the pods of beans and peas, are they fruits?" Again, botanically speaking, they are. However, in the last example, the individual beans and peas are the true seeds, the pods being the fruit part. As for the winged keys of the maple, they are double fruits, or two fruits joined together, each fruit having its own seed.

Aside from the true botanical classification of a fruit, we might say, horticulturally speaking, any edible pericarp is a fruit, or conversely so, as the seed case of the cantaloupe and the fleshy part of the peach.

It was previously mentioned that a fruit may have other flower parts amalgamated with it. The apple and the pear are examples of this fact, the edible part being the swelled lower portion of the flower calyx.

This subject of fruits is, indeed, an interesting one, and you and I could go on and on talking about them. However, we must stop here and "get back on the track". To this end, let us mention a few examples of the so-called true seeds, which are eaten by mankind: grains of corn and wheat, almonds and walnut "meats", and "shelled" beans and peas.

Not only do seeds play an important part in man's daily diet, but they also help to create the esthetic values of his flower beds and of the ornamental plants about his home. That basket of fancy, fresh vegetables he gathered with pride and satisfaction this morning would never have developed but for seeds. Then, let us meditate on their importance in the economic system of the world today. The fields of medicine, agricuture, horticulture, forestry and even industry are all dependent upon various forms of this little seed you hold in your hand. Realizing this fact, mankind must continually lay by quantities of seeds to plant and thus perpetuate his supply.

YEARS ago, our forefathers had to select and save their own seeds. Today, it is hardly worth our while to do so. Reliable seed-houses, with their large seed-producing farms, can supply us with better quality seed, truer to type, and at a cheaper price, than any the majority of us might produce.

Therefore, in purchasing seed, it is advisable to deal with only the approved seed-houses. They have reputations at stake and, for this reason, have invested large sums of money in maintaining and operating experimental farms where extensive tests are conducted in order that their clients may be assured of obtaining only the best possible seed.

It is said, "What ye sow, so shall ye reap." Sow good seed and you will reap good crops.

Today, most packets of seeds have stamped upon them the percentage of germination. If these packets have been purchased directly from a reliable source, it is very doubtful that the germination of these seeds will fall below the stated percentage.

There may be reasons for keeping a packet of seeds, or a part of one, until the following year. In such cases, it is advisable to test the seeds prior to planting. There are any number of methods to accomplish this.

My "pet" method is to take a large dish, similar to a soup plate or shallow casserole, about one and one-half inches deep and as flat-bottomed as possible, and to line the bottom with

Continued on page 23

THE BUTCHART GARDENS

By R. Ian Ross

THE Butchart Gardens at Tod Inlet near Victoria, the capital city of British Columbia, cover some twenty acres of a 130-acre estate. It is one of the outstanding, privately-owned places of the Pacific Northwest.

These gardens were developed by Mr. and Mrs. Robert Pim Butchart. Mr. Butchart was president and managing director of a cement company, whose plant was situated near their home at Tod Inlet, and an abandoned limestone quarry was the birthplace of the inspiration that started them on the trail of horticultural adventures and achievements. Into this quarry, Mr. and Mrs. Butchart brought tons of loam and planted thousands of trees, shrubs and plants, many of which were imported from every part of the world. Today, this particular spot is the renowned sunken garden, covering about two and a half acres.

From the beginning, Mr. and Mrs. Butchart welcomed all who came to see their beautiful gardens, and they aptly named their home "Benvenuto". For forty-six years, a constant stream of visitors has wandered through the grounds — let us join these sightseers.

Taking the upper drive, we pass by a lawn and pool. The background is native dogwood (*Cornus Nuttallii*) on one side and on the other, rambling roses festooned on pillars. Dwarf pink and blue viscaria edge the border in summer. In the spring the planting is composed of tulips and wallflowers over a blanket of pink and blue forget-me-nots. The border slopes away to a lawn which is dotted with exceptionally fine specimens of native maples. Rose standards edge the lawn on the far side. The residence "Benvenuto" stands in the background. On the slope of the lawn nearest to us, forget-me-nots and a lovely golden-yellow Siberian wallflower make a particularly fine showing. These are also planted around the rose standards. The forget-me-not has proven a very effective groundcover for tulips and wallflower and has been used for years at "Benvenuto." It is now a popular planting method in the Pacific Northwest.

Leaving the spacious lawns with their herbaceous borders for later inspection, we saunter along a woodland path. This brings us to the top of the walls of the sunken garden, which is spread out some fifty feet below us — a breath-taking panorama of color. The walls are hung with ivy and Virginia creeper (*Parthenocissus quinquefolia*). Directly below is the switchback path we shall follow, winding through a large rockery where gentians, saxifrages, lithospermum, Lebanon candytuft, penstemons and other rock and alpine plants abound. At the bottom, the central path winds gracefully between bed after bed of perennials with flowering trees and shrubs planted right up to the base of the towering walls. Outcroppings of rock are dotted with clumps of glory-of-the-snow in winter and are covered with rambler roses (Dorothy Perkins) in summer. In the middle distance is a towering rock island overlooking the

The residence from the northwest — the ground floor at the right now contains a restaurant. The two lawn terraces are divided by a long flower border.

This is the famous sunken garden—the floor of the old limestone quarry has been effectively planted.

still waters of a large artificial lake.

As we wind our way to the floor of the old quarry, new vistas of flowering loveliness are revealed. In this section extensive use is made of the weeping rosebud Japanese cherry (*Prunus subhirtella pendula*). A little farther on just as we come to an open stretch of lawn which ends at the lake, are two fine specimens of the arbor-vitae (*Thuja occidentalis fastigiata*). These trees have the appearance of systematic trimming but in reality are naturally symmetrical and their dense foliage has a spectacular effect. The margin of the lake is dotted with azaleas, flowering cherry, plum trees and the dwarf Japanese maple — both cutleaf and regular varieties — whose marvelous coloring is well known.

On the left a waterfall starts from the very top of the quarry. The sound of water splashing down the jagged rocks to a pool at the base, from whence it finds its way to the lake along a meandering stream, blends with the gentle rustling of the silvery leaves of two beautiful poplars (*Populus alba pyramidalis*). These trees, whose tips sway high above the top of the walls of the quarry, were planted by Mrs. Butchart personally over forty years ago.

Petasites japonicus, azaleas, dwarf juniper, cut-leaf maples and primulas are all around us. Here we see the double marsh-marigold (*Caltha palustris flore-pleno*), with its lovely yellow blooms, and the large-leaved, rhubarb-like plant, *Gunnera chilensis,* which provoke much comment.

Reaching the other side of the lake by a path following the shore line, we look back and notice the reflection of the flowers in the water. All around us are iris, azaleas, flowering Japanese crab (*Malus floribunda*), sycamore maples and purple-leaved flowering plums.

An arm of the lake winds around the rock island and beside it beds of dwarf pink and white astilbes nestle at the feet of beautiful weeping willows. Through their branches another lawn is revealed with its herbaceous borders backed with banks of large-flowered St. John's wort (*Hypericum calycinum*) and dotted with Japanese maples.

We continue along a poplar-lined, sloping, cement road which runs the entire length of the sunken garden and takes advantage of the low walls of the quarry on the west side. Below us the rock island dominates the scene like a miniature acropolis. Its sides are planted with alpines and dwarf shrubs and there is a stairway leading to its summit where climbing roses, flowering trees and native arbutus abound. Beside the winding stone steps leading to the top of this rock are fine specimens of the Japanese hydrangea-vine (*Schizophragma hydrangeoides*).

Tucked away in a shady corner is the famous "blue poppy" of Tibet (*Meconopsis betonicifolia Baileyi*). Mrs. Butchart was one of the first in North America to have this rare and delicate flower — the Edinburgh Botanical Gardens shared their first seeds with her. Captain Bailey, after whom the flower was named, was astonished to see the "blue poppy" flowering in all its glory here only a short time after it was introduced into cultivation in Great Britain.

We now have a choice of two routes; one, a tulip-bordered path winding around the nursery garden to an old ivy-covered barn and bird-houses overgrown with climbing roses; the other (which we take) skirts the south border of the nursery and passes a rhododendron grove. A turn to the left brings us by a short path to the rose garden with its central circular lawn surrounded by dwarf boxwood hedges and a flag-stone walk. The rose beds contain many varieties of the hybrid tea rose. Standing at the entrance we look over a frog fountain and see to our right a "wishing well" of Italian wrought-iron work. Directly ahead, across the lawn, a rose arbor leads to the upper lawn with the residence in the background. Behind us, running the length of the rose garden, is a long cement walk with a lush herbaceous border covered by rose arches, spaced some thirty feet apart. This joins the peony-bordered path leading from the bird houses. The rose garden is usually at its best early in July and the wealth of color is indeed a sight, not only in the rose garden itself but elsewhere, as roses are planted extensively throughout "Benvenuto."

Passing through an open pergola, whose arches are festooned with climbing and arbor roses, and between hedges of fragrant English lavender, we come upon vast beds of the dwarf polyanthus rose (*Rosa floribunda*).

We cross the upper terraced lawn to a path running under a Japanese Torii and along and between beds of annuals to the entrance to the Japanese garden. Hydrangeas, Japanese maples, the variegated fig palm (*Fatsia japonica*),

and umbrella-pine (*Sciadopitys verticillata*) surround the source of a small waterfall. Passing down steps and along a path which follows the winding stream, which bubbles and gurgles into two pools shaded by weeping willows, we see Japanese azaleas, bamboo, wisteria, dwarf rhododendrons, *Kerria japonica* and junipers. Here, also, is another bed of the Tibetan poppy. A lacquered bridge, small summer-houses, dwarf trees and shrubs and Japanese iris emphasize the motif of a Japanese garden.

Woodland walks leading from this area are lined with maidenhair fern and lily-of-the-valley. Through the trees we catch an occasional glimpse of the sea. The residence is about 100 feet above sea level and the grounds slope gently through the Japanese garden to the seashore. We could wander along the many enticing paths or sit quietly in one of the little houses set on stilts in the middle of a pool, but we must continue our journey.

We leave the Japanese garden by a long flight of steps which bring us to the lower lawn terrace. On each side of these steps are roses. To the right the dwarf polyanthus are planted in great numbers to cover a long sloping bank; on the left rambler roses are trained over wire to form a solid blanket of bloom.

At the top of the steps is the "star pond" completely enclosed with *Cryptomeria japonica*, trained in arches twenty feet high. English boxwood traces the outline of the pond at the water's edge, and between the points of the "star" are varieties of iris. A tiered fountain rises from the center with a group of frogs spouting water around its base.

The Italian garden is a rectangular area enclosed on the north side by Lawson cypress over thirty feet high and almost hiding the pyramid English oak planted beside them. In an alcove of the Lawson cypress is a bronze statue of Mercury, a fine example of Florentine art. On the east side is a long arched walk under that part of the residence enclosing the bowling alley. The south wall is the residence. On the west a bank of roses is surmounted by the lower lawn terrace which, in turn, is separated from the upper lawn by an ivy-covered wall and an antirrhinum border.

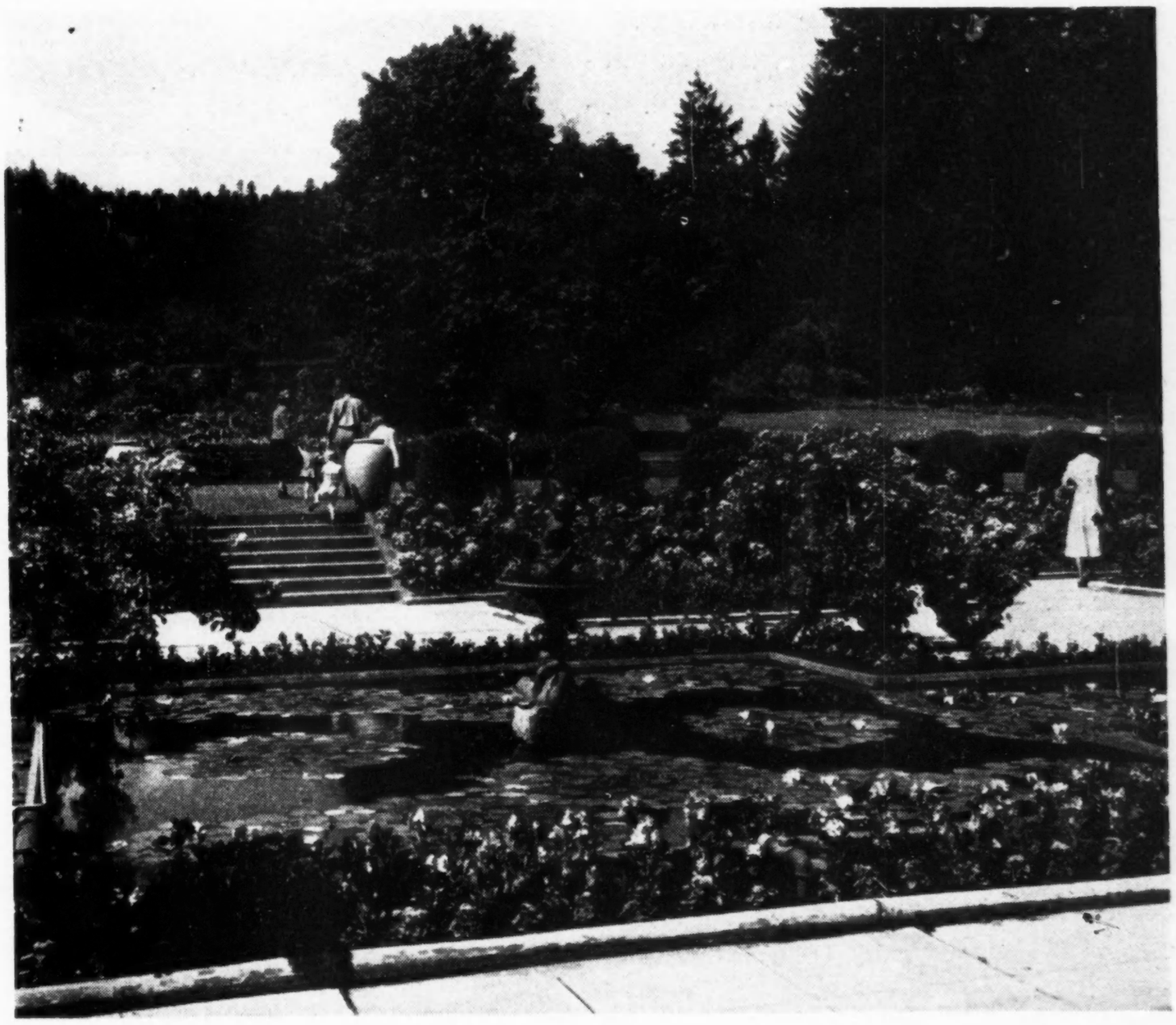
The Italian garden has, as its central theme, a rectangular lily pond fed by a mermaid and fish fountain and bordered by flower beds. Instead of grass, white concrete is used effectively between the regularly spaced, rectangular, raised beds around the pool. In the spring these beds are planted with tulips and forget-me-nots, followed by dwarf pompom zinnias; in the bed edging the pool, polyanthus and dwarf pink forget-me-nots are replaced in summer by waxleaf begonias and ageratum. Around the pool are weeping rose standards. Hanging baskets and window boxes filled with schizanthus, lobelia, geranium and variegated trailing nepeta, grace the ivy-covered walls and arches of the residence.

On the other side of the residence, which we reach through an arched tunnel under the house at ground level, is the show greenhouse. This is stocked in winter with primulas, cinerarias, cyclamen and calceolarias; with schizanthus, regal pelargonium (Martha Washington geranium), hydrangeas and hypericum later. In the summertime, begonias in all their varied colors and forms make a magnificent showing. Chrysanthemums replace the begonias in late October. In other greenhouses nearby exotic and rare plants and flowers are brought on for later display, both in the show house and in the conservatory of the restaurant in the main building.

Adjacent to the show greenhouse are the administration office and seed house. We leave "Benvenuto" through an avenue of hawthorn trees and see on either side the seed fields, four and a half acres in extent, of the Benvenuto Seed Company.

The Butchart Gardens, which are open to the public all the year round, suffered from lack of staff during the war years. However, since 1946 a program of rehabilitation and improvement has been carried on and "Benvenuto" is once more a place of exquisite beauty and one of Canada's famous places to be visited.

Mr. and Mrs. Butchart started their garden as a hobby and maintained it as such for nearly forty years. Mr. Butchart passed away in 1943; Mrs. Butchart on December 12, 1950, at the age of 82. She continued her active interest in garden clubs and societies throughout the Pacific Northwest and particularly in her own beautiful gardens till the end of her long, full life.



The lily pond is the central feature of the Italian garden.

Shrubs and Vines

Their Care and Maintenance

By Donald Wyman

The yellow flower clusters of the Oregon hollygrape, *Mahonia aquifolium*, are prominent in May against the shiny holly-like leaves. The latter turn purplish in autumn.

THE care or maintenance of shrubs is not difficult. Of course, it is necessary to provide good soil and sufficient moisture and sunshine. If these factors are lacking or deficient, the selection of the proper types of shrubs for such special situations—shrubs that are known to withstand trying conditions—is important. It is obviously unfair to expect plants to grow normally in places where growing conditions are abnormal.

Unless insect and disease troubles are handled correctly and promptly, plants may be destroyed. Lilacs, for instance, are liable to suffer from scales. So are euonymus and rose species. If these plants enter into your garden plans, their susceptibility to such troubles should be considered in advance and preparations made for adequate spraying. Otherwise, they should not be grown. Then there can be a serious and sudden influx of a pest, such as the Japanese beetle which eats many kinds of foliage. Of course, there is the rare insect or disease which may infest a certain species only.

Taken all in all, however, most of our shrubs and vines are not too susceptible to such troubles. This is an easy statement to make, and probably not agreed to by everyone, but our experience at the Arnold Arboretum has been that, with a few exceptions, serious insect and disease troubles do not attend most shrubs and vines.

We grow well over 5,000 different kinds of woody plants. This means our insect and disease problem is multiplied several times that of the average property holder. We spray for scale insects (a dormant oil) on *Rosa, Salix, Syringa, Euonymus, Chaenomeles* and *Celastrus*.

Rhododendron, Kalmia, often *Cotoneaster, Amelanchier* and a few other related plants are susceptible to infestations of red spider. Occasionally, *Salix, Robinia, Rhododendron, Syringa* and *Rosa* will be infested with borers. Other than these we have few insects on our shrubs which one spray of lead arsenate or DDT will not kill.

In fact, there are several groups of shrubs that don't even require that! *Berberis, Cytisus, Deutzia, Forsythia, Hydrangea, Ilex* (deciduous types), *Ligustrum* (except *L. vulgare*), *Lonicera* (a few species are infested with lice), *Philadelphus, Potentilla, Sambucus, Spiraea, Taxus, Vaccinium, Viburnum* (except *V. Opulus roseum* which is susceptible to lice), *Weigela* and *Wisteria* are only a few. Naturally there are a few persistent pests, such as the leaf miner of box and holly and the fire blight of cotoneaster, which are often rather difficult to eradicate. My point is that there are far more shrubs resistant or immune to disease and insect pests than are being attacked. Invariably though, we hear more about the plants that cause concern to the gardener.

There are nearly one thousand shrubs that might be considered as having great merit as ornamentals. Many others, of course, are of secondary importance as ornamentals. Then, there are the so-called "new" plants—plants that have not appeared in catalogues or have been introduced recently.

Many of our popular plants, such as lilacs, wisterias, deutzias, spireas and forsythias are of interest chiefly when they are in flower. They have

no ornamentally significant fruits, no autumn color, and their habit in the wintertime is not especially outstanding. With concentrated efforts spent today on building smaller homes and gardens, the selection of garden plants becomes a most important one and the increasingly valuable space should be given to those plants which have the longer period of interest in the garden.

Flowers are certainly an important asset, but bright-colored fruits are just as valuable in the fall. So is brilliant autumn color, for this can be so predominant as to "make" a cherished picture in the garden. Summer foliage is an important consideration, too, because some plants have better foliage throughout the summer months than others. General form or habit is an important characteristic as well, especially if the plant is used as a specimen in a conspicuous part of the garden. The twig and bark characteristics of certain shrubs make them additionally interesting in winter when this asset is most clearly noticed. Finally, some evergreens have much better winter foliage than others.

With these general points in mind, I append a list of shrubs which are of interest more than one season of the year. They could very easily be given prominent space in any garden where accent plants are being considered.

Cutting out dead or diseased twigs, pruning out branches that grow prematurely old, and occasionally cutting plants back hard for renewal pruning —these are about the only legitimate excuses for pruning most shrubs. Normally, they should be left alone. It is different with hedges.

There are well over a hundred different kinds of shrubs that will withstand the severe pruning usually necessary for hedges. Here, the problem is to shear the hedge, preferably once a year, at the end of the period of growth elongation. This forces the plants into a dense bushy growth of the type we like to see in hedges. In most cases, the best time for this pruning is the middle or end of June or, with evergreens, early July. Sometimes, a second quick shearing is needed at the end of summer. Not all plants are in the same class as the fast-growing privets which require shearing several times a year. In fact, some plants, such as *Euonymus alatus compactus,* make the ideal hedge in that they need to be sheared only once every three years.

Most twining vines may be classified under either one of two groups—those which twine by climbing from right to left: (*Berchemia, Dioscorea, Lonicera, Schisandra, Wisteria floribunda,* and *W. formosa*) and those which twine by climbing from left to right: (*Actinidia, Akebia, Aristolochia, Celastrus, Menispermum, Periploca, Wisteria frutescens, W. macrostachya* and *W. sinensis*). Knowing this peculiarity, it is easier to assist the vines by proper tying. For the most part, vines are used to cover a specific object and they are trained to accomplish this as quickly as possible.

It is a simple matter to "rejuvenate" most vines by the mere expedient of cutting them off at ground level, thus forcing them to come up with entirely new growth. With a very old wisteria that has grown a very thick trunk, this may not be done quite so easily, but with most vines that are not doing well, or have a lot of dead wood, this is the easier method. Pruning out dead wood piece by piece requires much more time.

The fruiting bittersweets (*Celastrus*) have separate sexes so both staminate and pistillate plants must be used in order to insure fruiting of the pistillate plant. Incidentally, the commercial grower could very easily bud or graft a small piece of the staminate vine on the pistillate and thus insure the fruiting of every plant he sells.

(*See chart on page* 12)

The many-stamened, petal-less, white flowers of *Fothergilla major* appear in May as the witch-hazel--like leaves unfold.

In June pink flowers cover the pendulous, twiggy branches of the Beauty-bush, *Kolkwitzia amabilis.*

SHRUBS OF MORE THAN ONE-SEASON INTEREST

Abelia grandiflora
Acer palmatum varieties
Amelanchier grandiflora
Berberis species
Chionanthus virginica
Cornus alba sibirica
" mas
Cotinus Coggygria purpureus
Cotoneaster Dammeri
" horizontalis
" microphylla
" salicifolia floccosa
Cytisus praecox
" scoparius
Daphne species
Enkianthus species
Euonymus alatus compactus
" Fortunei vegetus
Fothergilla species
Hamamelis species
Hydrangea petiolaris
Ilex crenata
" yunnanensis
Kalmia latifolia
Kolkwitzia amabilis
Leucothoe Catesbaei
Ligustrum obtusifolium Regelianum
Lonicera amoena arnoldiana
" bella
" fragrantissima
" Korolkowii floribunda
" Maackii
" tatarica
Magnolia stellata
Magnolia virginiana
Mahonia species
Malus Sargentii
Philadelphus floridus
" grandiflorus
" laxus
" Lemoinei "Avalanche"
" splendens
Pieris species
Prinsepia sinensis
Prunus tomentosa
Rhododendron carolinianum
" catawbiense
" Fortunei
" Schlippenbachii
" Vaseyi
Rosa Heleniae
" multiflora
" Roxburghii
" rugosa
Spiraea prunifolia plena
Taxus baccata
" cuspidata
" media
Vaccinium corymbosum
Viburnum cassinoides
" dilatatum
" Lentago
" Opulus
" prunifolium
" rufidulum
" Sargentii flavum
" Sieboldii
" tomentosum Mariesii
" trilobum

SHRUBS FOR GOOD HEDGES UNDER THE RIGHT CONDITIONS

Abelia grandiflora
Acanthopanax Sieboldianus
Berberis species
Buxus species
Caragana arborescens
Chaenomeles japonica
Chamaecypa is pisifera varieties
Cornus mas
" racemosa
Cotoneaster lucida
Euonymus alatus compactus
Hibiscus syriacus
Hydrangea arborescens grandiflora
" macrophylla
Ilex crenata varieties
Ligustrum species
Philadelphus Lemoinei "Avalanche"
" " erectus
Prinsepia species
Pyracantha coccinea Lalandii
Rhamnus Frangula
Rhododendron obtusum amoenum
Rosa multiflora
" virginiana
Spiraea arguta
" Vanhouttei
Syringa species
Taxus species
Thuja species
Viburnum dentatum
" Lentago
" Opulus nanum
" prunifolium

VINES THAT MAY BE TRAINED TO COVER QUICKLY

Akebia quinata
Ampelopsis brevipedunculata
Campsis Tagliabuana "Madame Galen"
Celastrus orbiculatus
" scandens
Clematis Jackmanii and hybrids
" lanuginosa and hybrids
" macropetala
" montana rubens
" paniculata
" tangutica
" texensis
" Vitalba
" Viticella hybrids
Euonymus Fortunei
" " Carrierei
" " coloratus
" " gracilis
Euonymus Fortunei vegetus
Hedera helix and varieties
Hydrangea petiolaris
Lonicera Heckrottii
" sempervirens
Parthenocissus quinquefolia
" " Engelmannii
" " St. Paulii
" tricuspidata
" " Lowii
Polygonum Aubertii
Rosa—desirable rambler types
Wisteria floribunda alba
" " macrobotrys
" " rosea
" sinensis
" " alba

The Amenities of Tree Collecting

By Albert L. Baily, Jr.

I DON'T know *why* anyone wants to build an arboretum. All I know is that I have wanted to build one. But whether it is the result of a strong instinct for collecting, or whether it is a sort of reach for immortality, or whether it is the desire to earn praise, I do not know. There are all kinds of good excuses I might offer, such as encouraging others to take an interest in trees, to experiment with unusual trees and thus increase the general knowledge, to serve beauty (an unconvincing excuse) or scientific interest (synonymous with idle curiosity). As a matter of fact, it was none of these things that led me to begin to collect trees; rather it was the circumstances into which I was involuntarily thrown.

I was taking a new job — teaching at a Quaker boarding school — and the Headmaster remarked casually, "We need someone to teach botany. Thee is to do that." I protested that while I had been interested in birds I had never studied botany and was not qualified. The answer settled the matter. "Thee has six months to find out enough to teach the subject. The class will be the ninth grade and we should like the course based on what the campus affords."

Westtown School is an old school, having been opened in 1799. The year 1921 saw me hired as an inexperienced teacher. That summer I enrolled at North Western University for botany I, but since only two people had elected botany, the course was dropped. I arrived at Westtown in September a short jump ahead of the class I was to teach.

The campus contained 600 acres and comprised orchard, farm, lawn, forest, a ten-acre lake and the remains of an arboretum that had been started fifteen years before. The man whose en-

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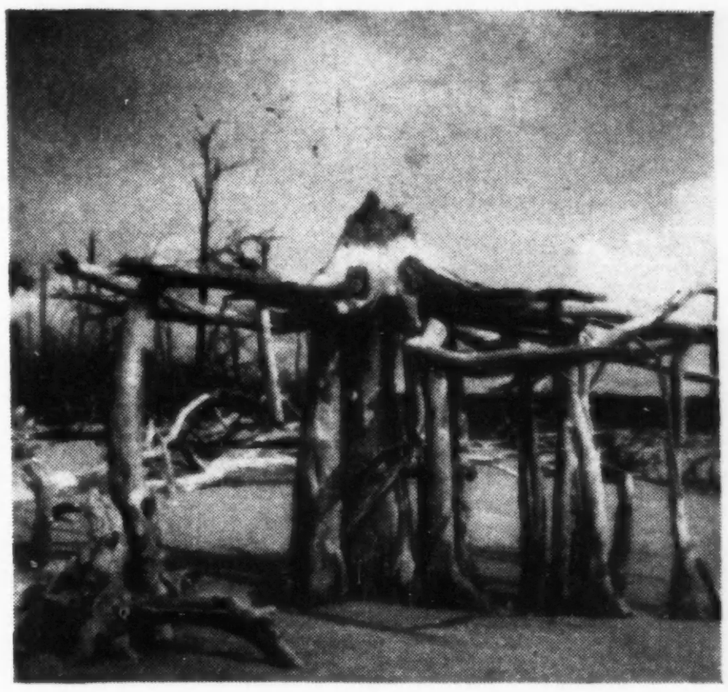
Bulls Island

Wild Life Refuge

By William F. Drescher



Destructive action by the ocean along the shore line has exposed tree roots in all their grotesquery.

FIFTEEN miles or more north of Charleston, South Carolina, lies Bulls Island, one of the numerous sea level islands which dot that locality.

Once privately owned, Bulls Island is now one of the many refuges under management of the U. S. Fish & Wildlife Service. At present, it is some five or six miles long and from a mile to two miles wide, but there is evidence that at one time it covered a considerably larger area.

The Island is quite heavily wooded. The trees are live oaks, pines and palmetto, the last being in the majority. Thick underbrush covers the ground. This consists primarily of seedling palmettos, Spanish bayonet and prickly pear, with spines from one to one and a half inches long that cling to the hiker's boots. And as if this were not sufficient to discourage the hiker from trying to cut through the undergrowth, vines hang down from the trees to impede his progress, and hordes of mosquitoes buzz their song of welcome — or is it annoyance that their solitude is being disturbed?

As previously stated, Bulls Island at one time covered a much larger area. This may be readily seen in the accompanying illustrations. Upright tree trunks and roots still in original position on the beach and at some distance from the present shore line indicate that soil to the depth of five or six feet has been washed away in the course of time.

There are several fresh water ponds heavily lined with reeds and these with a cattail marsh provide excellent feeding and breeding grounds for many types of birds, principally rails, coots, gallinules and ducks. Egrets and herons, as is to be expected in this region, are especially numerous.

Not only on Bulls Island but on all the adjoining islets, American egret, snowy egret, little blue heron in both phases (the immature being white), great blue heron, Louisiana heron, black - crowned and yellow - crowned night heron and wood ibis, along with forsters, common and royal terns seem to be constantly flying about somewhere. The terns and the cumbersome brown pelican breed in large numbers in nearby Cape Romain Island.

Other interesting birds to watch are the oyster catcher and black skimmer. The latter is certainly well named. It skims along the surface of the water, its long lower mandible apparently in contact with the water, scooping up food as it flies along.

There is no scarcity of turkey buzzards. Usually these are to be found roosting in dead trees along the beach where, like Micawber, they are waiting for something to "turn up."

As the beach is very shallow, waves wash up many shells of various kinds. The majority of these are the large sea scallop, a snail shell called by Italians scungilli, and the very interesting "sand dollar". This is really an oddity: a flat disk-like shell from an inch and, I have been told, up to six inches in diameter, flat on its under side and slightly convex on the upper side, about ¼ inch thick at the apex. On its under side is a perfectly incised "hickory leaf" as though cut in by hand.

Continued on page 32

RICE FARMING -- IN THE UNITED STATES

By Betty Wilson Higinbotham

RICE culture in the Orient is characterized by picturesque and primitive methods that make a humble sort of pageant of the process. In North America, there is nothing of the primitive in our modern machine methods of rice farming, but there is still an element of the exotic associated with its cultivation.

Part of the oddity of rice culture is due to the flooded fields in which it is grown. Neither wheat nor barley, corn nor rye requires the unusual conditions of rice, which is restricted to areas or tropical climates and lowlands that can be flooded and drained with ease. Such areas are to be found in this country especially in Louisiana, Arkansas and eastern Texas, but also in the southeastern states, in Missouri, and in California.

The wild life associated with rice fields is so well adapted to the peculiar conditions existing there that the animals sometimes flourish and reproduce as well as the rice itself. The cotton-mouth moccasin is a common hazard, not because its numbers interfere with the growth of rice, but because it is poisonous and treated with considerable caution by field hands. A single snake can create a commotion and loss of time among the workers quite out of proportion to its size or its aggressiveness. In spite of its lethal reputation, it is a sluggish creature, normally unwilling to face man.

Occasionally mosquitoes are blown in from the Gulf Coast to eastern Texas rice areas in such clouds that all outdoor work is suspended, and cattle, driven mad, break down the fences and roam the roads and countryside seeking relief. It is at first surprising then, with flooded rice fields everywhere available and made-to-order for mosquito breeding pools, that the countryside is not completely uninhabitable because of mosquito hordes.

Actually there are very few mosquitoes bred in the rice fields, thanks to another denizen of their waters. Tiny minnows by the thousands are carried with the current when water from the canals is released or pumped into the fields. Once the fields are flooded and the ditches closed to keep the water within, the minnows are stranded in the rice fields, where they grow fat on insects and any mosquito larvae they can find. Before harvest time, the water is drained back and the minnows are returned to the ditches and canals from which they came. This is true in Texas, where rivers are the source of irrigation water. Where well water is used, on the other hand, with no minnows as a control, mosquitoes have been so troublesome that there are authorities who hold them accountable for the failure of rice farming in certain of those areas. Field hands could not be induced to remain at work in fields in which the mosquitoes were unbearably abundant.

OF all the wildlife that patronize the rice growers' fields, none is more interesting nor more plaguing than the birds. Migratory seasons seem to have been planned to coincide with the maturing of the nutritious rice grains. Birds of several kinds grow fat on their reaping of the cereal but outstanding nuisances are the bobolink—also called black bird and rice bird—and the mud hen.

The rice-plumped black bird is eaten, poisoned, shot and just bullied in more or less vain efforts to keep him from the grain. "Four-and-twenty blackbirds, baked into a pie" is not just a myth in rice areas, it is reality and, as recommended by those who have tried it, a tasty reality.

In some of the experiment stations, where hybrid seed is grown in small quantities and it is important that none is lost, a schoolboy patrols a field with shotgun and blanks or shells, either of which produces a greater effect on the boy than on the birds. Another measure occasionally resorted to is a long black Simon-Legree type of bull whip. This is cracked over the field at intervals in an effort to keep the flocks of rice birds from landing.

The mud hen uses a different approach from the persistent and daring black bird. This dark bird creeps so secretively between the rice plants that it is not often seen. Its presence is well recorded, however, for where it nests it pulls together large patches of rice stems into a mat of vegetation. Its clandestine runways also are made by tangling together the rice plants. Such destructive habits do nothing to endear the bird to the rice farmer. Retaliating in a control measure not unlike that of the minnow and the mosquito, field hands may eat the hen's eggs in quantities. The eggs are sucked from the shell in the field. Possibilities for picking up excessively ripened eggs are avoided by a rule-of-thumb grading system: four or five eggs in a nest and the eggs are too old; not more than two or three eggs in a nest and they will be fresh and edible. (The author does not guarantee this system and will not be responsible for any failures.) If there seems to be reason for an additional check, a bit of shell can be broken from one end of the egg and the egg "candled" by being held to the sun. During the egg-laying season, it has been reported as not unusual to recover 200 eggs from a field.

In spite of all of the animal inhabitants that prosper in a rice field, the rice itself almost invariably produces a good crop at harvest time unless damaged by hurricanes.

When first cultivated in this country, each rice seed was imbedded in a small ball of clay and dropped onto the flooded field where it sank to the bottom and germinated. Today rice is often "planted" broadcast from airplanes in California and by grain drills in other states as with wheat and oats.

Rice seedlings now are allowed to grow until they are about six or eight inches high before the field is flooded. After water is turned into the fields, fish and bird and plant inhabitants seem to grow apace.

Weeds are troublesome interlopers from the first and were formerly dealt with by hand pulling or not at all. Only clean and careful planting can prevent the disaster of being over-run by

weeds, since rice fields cannot be cultivated by machine. Now 2, 4-D is used.

Aside from reducing the yield markedly, some rice-field weeds have an added effect. Some weeds have seeds of a size and shape that make it impossible to screen them completely from the rice itself. These seeds happen to resemble closely the droppings of mice or rats and, when found in a freshly-opened package of white rice, result in a very dissatisfied customer.

Combining of rice was scarcely started before World War II. Previously rice had been harvested by use of a binder similar to that used on wheat and upland grain crops. During the war, however, the changeover to combines was accelerated because of the shortage of manpower. Now practically all rice is combined.

Combined rice can be cut later than rice that was shocked, but it is removed from the field earlier and the grain dried elsewhere than in the shock. Threshed rice standing in the field in shocks was at the mercy of the weather until the grain had dried sufficiently. If very wet weather prevailed at this critical time, the mature rice grains would germinate in the shock and be ruined for use. Combines can harvest rice in spite of wet weather. If the mud becomes too sticky, the fields can be reflooded and the combine will work in shallow water. Combining also enables farmers to handle their grain in the bulk, as in hoppers and dump trucks, rather than by the sack.

Rice is grown in very large fields, parcelled into sections, usually, rather than into the smaller unit of acres. Golden fields of mature rice are a glorious sight. Usually less willowy stemmed than wheat, heavy grained heads of rice nod in graceful curving lines.

As in other important cereals, scientists are constantly at work to produce and to introduce new varieties that will have advantages over the old kinds. One interesting kind of rice, "scented rice," has a delicate sachet-like fragrance.

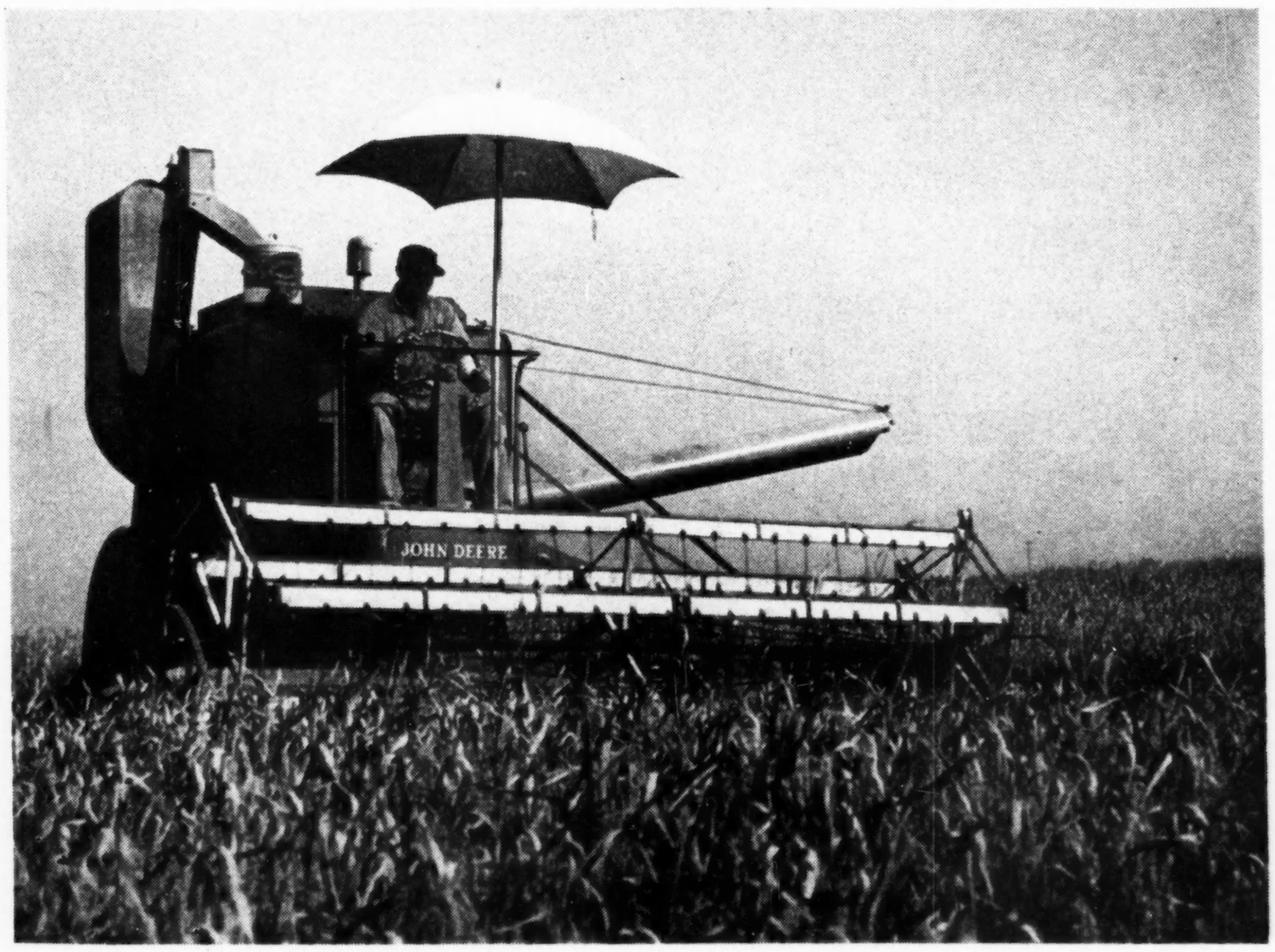
Many northerners do not realize that the rice-growing South often sends its least desirable varieties of rice up to the Yankee, who is regarded as no connoisseur of rice. To the southerner, who not infrequently eats rice three meals a day and looks upon potatoes and gravy as a very poor substitute, indeed, for rice and gravy, it is much simpler to ship the short-grained, starchy, easily-milled Blue Rose or similar varieties north. The long-and-slender varieties of rice, also called "patna", are the fancy varieties largely kept for southern consumption, where they are carefully cooked so that each grain stands apart as a snowy white flake without a trace of gumminess. The northerner rarely ever looks at the shape of a rice grain, so that the southerner can hardly be blamed for unloading the more undesirable types on such a guillible customer.

Actually rice growers do not differentiate between rice grown for the South and that grown for the North. The two types of consumers are more often classed as "general trade" and "fancy trade". Distribution of the two trades just happens to be north for the "general trade", which accepts, or sometimes prefers, a gummy cooking rice, and south for the "fancy trade", or those who like the dry type. There are some areas in the South, however, where short-grained gummy rice is preferred. The "fancy trade" long-grain rice brings the grower a better price but is more susceptible to breaking in milling.

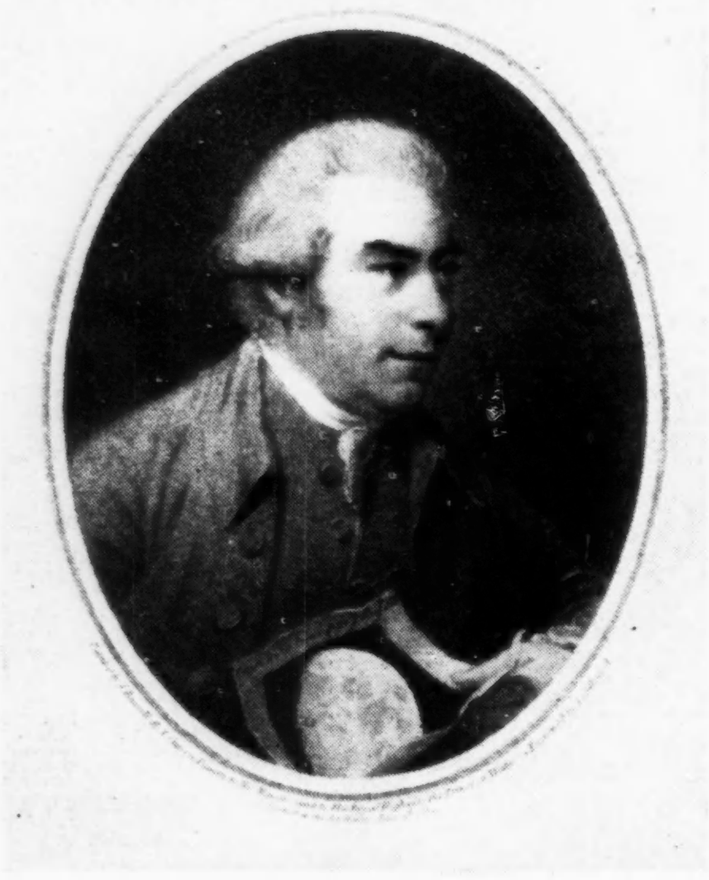
Pearliness of rice is the result of an interesting custom in marketing. After all husk is removed from the grain, it is coated with talc as the last process before being boxed. Yet the first thing the cook does on opening that box is to wash off this talc coating. The talc, however, has served its purpose; it has added to the appearance of the product. This is not done, of course, in the brown rice and pre-cooked or converted rices that are now available.

The culture of rice may have begun spreading from the Indo-China area about 3,000 B.C. If bands of Mongolians crossed from China over the Aleutians to become the forerunners of the American Indian, they apparently brought no rice with them. There seems to be no evidence of rice having been introduced to this country until about 1685, when it was brought to South Carolina. The wild rice that is and long has been harvested by American Indians is not the true rice.

Rice is the most commonly used cereal in the world, outranking even wheat. If this seems startling, in the light of its relatively small use in this country, it should be remembered that the greatest rice consuming countries are those of Asia and outlying islands, all of which are characterized by enormous populations. The annual per capita consumption of rice in the United States has been estimated at under six pounds. In the Orient, it is from 200 to 400 pounds a year. Multiply this figure several million times to account for each Oriental, and the great importance of this food becomes manifest.



In the United States, modern farm machinery replaces the primitive rice growing methods of the Orient.



Sir Joseph Banks Bart.
President of the Royal Society.

SIR Joseph Banks is one of the few men of eighteenth century science, whose numerous discoveries and undertakings are living, visible things today. Certainly, no man among his contemporaries gained the devotion, esteem and admiration of a more diversified group of individuals. He inspired and financed botanical gardens and horticultural interest throughout the world. Kew Gardens, the mecca for all botanists, is a living memorial to his foresight in subsidizing botanists and explorers all over the earth, while he acted as scientific adviser to George III.

Banks shared the famous circumnavigation with Captain James Cook and promoted and partly financed the voyage of the "Bounty." As a matter of fact, it was Banks who warmly recommended that Lieutenant William Bligh, R. N., be made captain of their trip. "Mutiny on the Bounty" is still one of the most thrilling adventures in world annals.

Joseph Banks was born at Argyle Street, London, February 13, 1743. His father was William Banks of Revesby Abbey, Lincolnshire; his mother, Marianne, the daughter of William Bates. Being the son of a wealthy gentleman, Joseph was tutored at home until he was nine; then he was sent to Harrow and at thirteen he went on to Eton, which did not have classes in botany. However, that did not stop Banks' youthful enthusiasm for natural science. He spent his free time hunting plants and insects. To "cullers of samples" (women gathering in the fields plants for druggists' shops) he paid six pence for information and samples.

While at home for the holidays, Joseph was delighted to find a copy of Gerarde's *Herbal* on his mother's dressing table. He was thrilled with its descriptions and engravings of the plants he had collected. He took the old, torn book back to school and continued "hunting", making an herbarium of the plants and a cabinet for the insects. His new interest was not a phase—he had begun his life's work.

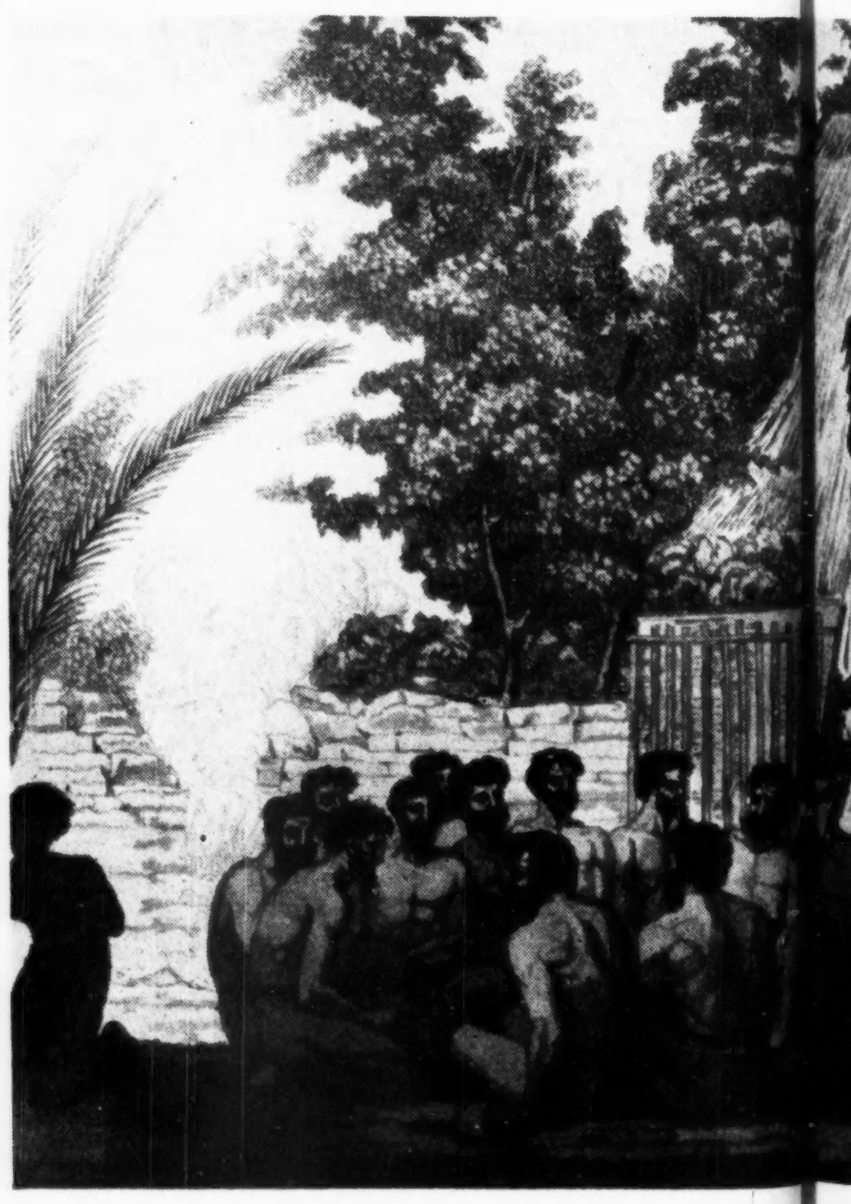
At seventeen, Joseph entered Oxford as a gentleman commoner at Christ Church. His enthusiasm for botany continued and he became greatly interested in the other branches of natural history. During his first year at Oxford, Joseph's father died and his mother, always eager to further her son's ambition, then moved to London. She found a charming Queen Anne mansion in Paradise Walk near the famous Apothecaries' Gardens, Chelsea. It was a delightful suburb in those days — with fine gardens and the companies of cultured gentlefolk—and afforded opportunities to Joseph to continue his pursuit of botany, zoology and the other natural sciences.

Upon reaching his majority — the year after he had left Oxford with an honorary M.A. — Joseph inherited his father's ample fortune, which included Revesby Abbey in Lincolnshire.

Banks' reputation as a natural history student was responsible for his election as a Fellow of the Royal Society at the remarkably early age of twenty-three. It was during this year that Joseph, unlike his friends who followed the vogue and took the fashionable "grand tour" or a trip to Paris, sailed to Newfoundland and Labrador to collect plants. He joined an Oxford friend, Lieutenant Constantine Phipps (Lord Mulgrave), who was in command of the "Niger" and whose mission it was to protect the fisheries. They sailed as far north as the Equinox Islands, off Labrador. The list of botanical plants collected is the earliest in existence for Newfoundland.

Two years later, in 1768, an unusual opportunity came to Joseph. Circumnavigation was a comparatively new topic of conversation and of definite interest in political as well as scientific circles. British and French captains and adventurers who traveled into unknown seas told many fascinating stories. Banks obtained permission through the influence of a neighbor and friend, Lord Sandwich, first lord of the admiralty, to accompany Cook's expedition, "to observe the Transit of Venus."

It is estimated that Banks spent $50,000 in equipment and salaries for this thrilling adventure. His party included Dr. Daniel Carl Solander, foremost pupil of Linnaeus; Alexander Buchan, who went as landscape and figure artist; and Sydney Parkinson, the artist for natural history subjects.



Captain Cook at Sandwich Islands.
(Colored etching and aquatint by A. Biaschi after A. Bottigella).

...h Banks

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The expedition left Plymouth, August 25, 1768, and returned to Deal, November 21, 1771. It was Captain James Cook's first trip in the "Endeavour" and turned out to be the most momentous voyage of discovery which had been made up to that time. Actually, New South Wales was born as a result of this trip and its "people have kept green the memory of Banks and still hold his name in undying honor."

During the three weeks' passage to Madeira, Banks captured many surface animals and marine birds. At Madeira, he found 18 fish and 299 plants. Upon arrival in Rio de Janeiro, the party found the Portuguese officials unfriendly and uncooperative, so that most of the plant collecting had to be done by stealth. Although the conditions were unfavorable, it is noteworthy that Banks and Solander collected 316 plants.

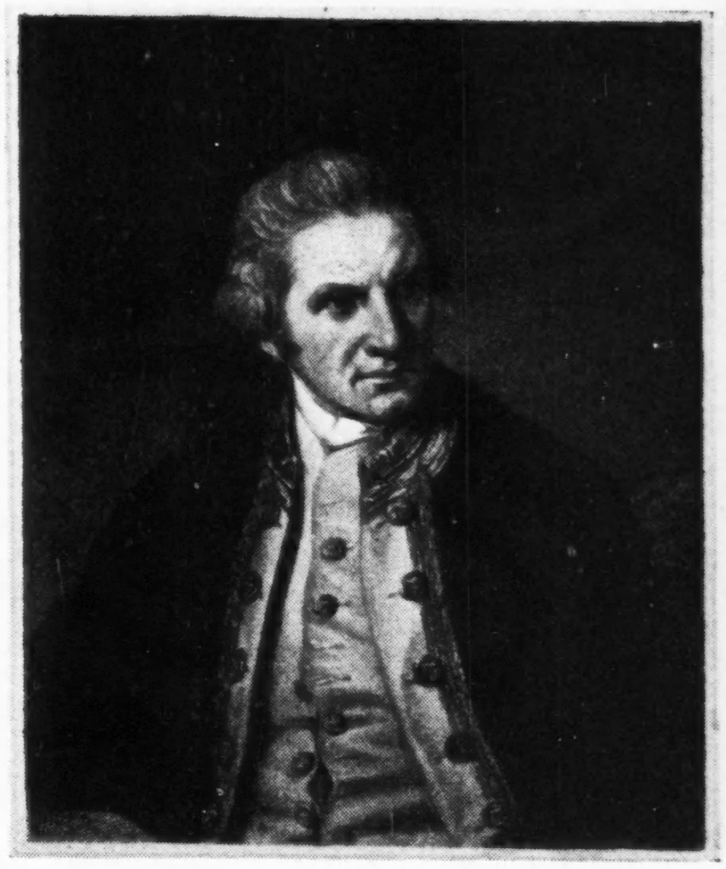
Next, they landed near Cape St. Vincent and found 100 new plants within four hours — including giant seaweed and winter's bark. They continued their voyage and discovered, at the Bay of Good Success, 104 phanerogamic and 41 cryptogamic plants.

Finally, on April 13, the party landed at Tahiti, which was the appointed place for the observation of the "Transit of Venus." Banks mastered the Tahitian language and became interpreter for the party with the friendly natives. It was in this role that he was successful in getting food and recovering the stolen quadrant, through which the transit across the sun was to be observed. The transit was observed on June 3, 1769 — this phenomenon advanced geographical science as well as astronomy, on which navigation so greatly depends.

Before leaving Tahiti, Banks explored the island completely. He sowed seeds of melons and other plants, which he had brought from Rio, in suitable spots. The world was astounded by the reports about these primitive people and the flora and fauna of these distant and unknown islands.

The next port of call was Poverty Bay, New Zealand. It was the first time the white man had disturbed the Maoris. They settled there about 1350 A.D., and proved hostile to the party. However, six months were spent exploring the coast and gathering forty different species of plants.

When Cook circumnavigated New Zealand, he was surprised to find that it consisted of two islands—never realizing there was an entire continent nearby. He hoisted the British flag on January 31, 1770, and New Zealand was annexed to the British Crown. He then called a council to plan the return route. Their decision was epic making. They set sail and on April 28, Banks' journal states: "An opening like an harbour appeared by noon — we were within the mouth of Botany Bay". This was one of the most important events of the voyage—the re-discovery of New South Wales and later, the settlement by the British of the continent of Australia. The Bay was so named because of the abundance of plants found by Banks and Solander—plants which they had never seen before. Actually, they collected nearly 1,000 species at Botany Bay and other places along the eastern coast.



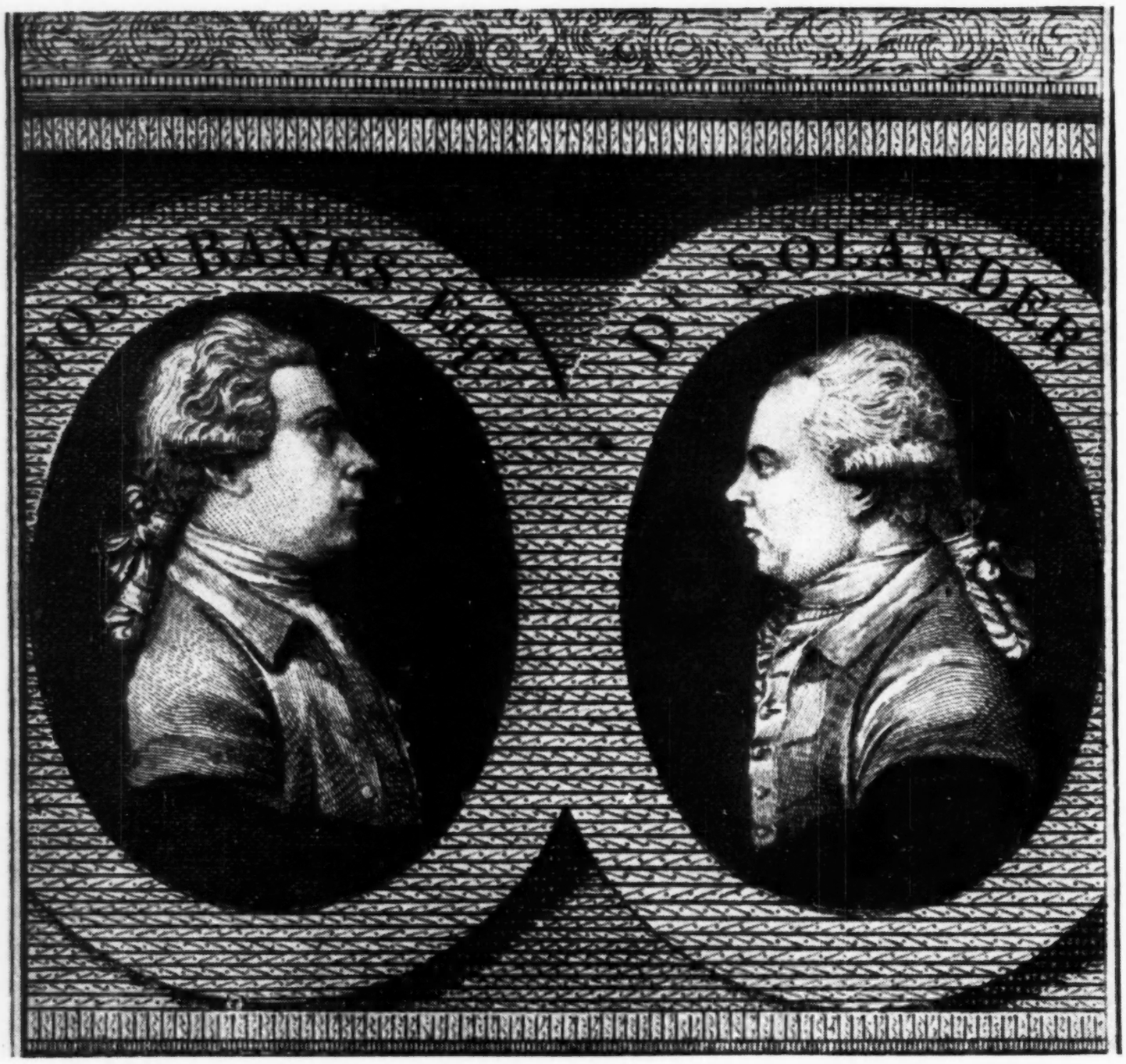
Captain Cook. (Engraved by E. Scriven. From an original picture by Dance in the gallery of Greenwich Hospital).

Banks introduced *Casuarina torulosa* from New South Wales. It was the first Australian plant to reach Europe and was growing in Kew Gardens in 1772. From the time he returned to England in 1771 until his death in 1820, Banks never lost an opportunity of adding Australian plants to the gardens of the north.

The course of the voyage was northward, inside the great barrier reef on the northeast coast of Queensland. On June 10, 1770, the "Endeavour" stuck fast on a coral rock. By dumping nearly fifty tons overboard, the ship was refloated and taken into a convenient harbor for repairs. Unfortunately, water leakage in the aft hold ruined many of the dried plants collected during the early part of the voyage.

On July 4, the ship sailed through a channel to the open sea and on to New Guinea, past the Dutch possessions in the Malay Archipelago, to Batavia where it was refitted. The "Endeavour" sailed from Batavia on December 27, but not before forty persons had contracted malaria. Most of the rest of the party were weak from the effects of the climate. While traveling from Java to the Cape of Good Hope, Sydney Parkinson, landscape artist, and Herman Sporing, draftsman, died and were buried at sea. The total number of deaths was thirty.

The undaunted explorers and bot-



Joseph Banks, Esq., and Dr. Carl Solander. (The Engraver is unknown.)

anists reached Deal, November 21, 1771, after a voyage of over three years. England praised their accomplishments.

Banks was lionized and received an honorary D.C.L. from Oxford. George III became his loyal friend and patron.

The voyage was considered so successful that a second trip was planned —the ship, the "Resolution", the commander, Captain James Cook. Banks again offered to accompany and finance the expedition. He engaged Zoffany, the painter, three draftsmen, two secretaries and nine other skilled assistants. As the "Resolution" did not have space for this entourage, additional quarters were built. Then, on her trial run, it was found that the alterations had made the ship unseaworthy. The quarters were demolished and Banks abandoned the project.

Disappointed by these complications, Banks began preparations for a scientific expedition to Iceland. No expense was spared and after consulting with the inseparable Solander, forty persons were engaged and set sail on July 12, 1772.

After the discovery of Staffa off the coast of Scotland, the cruise continued to Iceland. This trip was highly successful. Not only were many botanical specimens brought back to enrich Banks' herbarium and Kew Gardens, but also rare Icelandic manuscripts. Dr. Uno von Troil, a Swedish clergyman, and a member of the party, told about the trip in the volume he had published upon returning to England.

When the president of the Royal Society, Sir John Pringle, retired in 1777, Banks was unanimously elected to succeed him. This part of his career was more treacherous than the "Endeavour" expedition. However, the usual "club" difficulties ironed themselves out and 1784 found Banks presiding forcefully, yet harmoniously. He held this office for forty years!

In the meantime, Banks married Dorothea Weston-Hugessen, daughter of William Weston-Hugessen, from Provender, in Kent. Her duties must have been arduous as the three houses, with their noted libraries and vast museums, were always open to all who sought scientific knowledge. Banks was particularly cosmopolitan in his sympathies and his views were liberal; he insisted that scientific men should not be separated by birth or political divisions. His prolific correspondence testifies to this unbounded hospitality.

Banks suffered a great loss in the spring of 1782, when his best friend, Dr. Solander, died very suddenly of paralysis. The following year, Banks was in a carriage accident and, as a result, for fourteen years did not possess the use of his limbs. He had to be carried about in a chair and suffered at times severely from gout. However, his mind remained active and as president of the Royal Society, he conducted himself with rare dignity and ease, irrespective of his infirmity. At Revesby Abbey*, he enjoyed periods of relaxation. It was ideally situated in a spacious park, the large square house on a slight rise, with an extensive view of the pastures where sheep and deer roamed the peaceful landscape. Here Banks played the role of the true country squire, reveling in the joys and vicissitudes of the rural atmosphere.

Spring Grove, another estate of Sir Joseph, and the favorite abode of Mrs. Banks and his sister, Sarah, acquired its name from a cool spring in the adjacent woods. The hothouses and conservatories, with their tropical fruits and exotic plants, were cared for by capable gardeners. The members of the horticultural society were interested in the ever increasing collection of plants sent by Kew for experimental purposes, as well as by botanists the world over in gratitude to their benefactor.

During the reign of George III, nearly 7,000 new plants were brought into cultivation in England, largely through the efforts of Banks and his collectors. He was interested in economic as well as ornamental plants and became involved in the project to acclimatize breadfruit trees in the West India Islands. Banks first became acquainted with these trees when the "Endeavour" under James Cook stopped at Batavia on October 9, 1770, and he encouraged the expedition to the South Seas in 1787. But the "Bounty", commanded by Capt. Bligh, was ill-fated and the 1,000 breadfruit trees

Continued on page 25)

***Banks mentioned the gaiety of the seasons at Revesby and a ball given by his neighbor, Lord Munson in 1805. Just 100 years later, the author visited Lord Munson shortly after the heir apparent was born.**

Tree Collecting

Continued from page 12

thusiasm had led to the first planting in 1906 had been the English teacher. He had set out ten each of fifty different species of trees on a twenty-acre plot of cut-over virgin forest. He had spotted his specimens in among the tree stumps and had cut back the rootshoots from the stumps as they appeared. It must have been a herculean task unless the class helped. Quite unfortunately, he fell a victim to pneumonia three years later and there was no one else on the faculty who was interested in trees. The rootshoots grew unhindered. The specimens grew tall and narrow. Those of naturally slow growth were killed by the competition and in 1921 the Westtown Arboretum consisted of a number of spindling trees in a dense thicket of vigorous volunteers. A few of these trees are alive, but not more than 4 or 5% of the 1906 planting.

The first time the botany class met in 1921, we took a walk around the campus and viewed the remains of the Arboretum. Youth is always enthusiastic and, if I remember, it was a boy of fourteen who proposed that "we ought to clean up the whole place".

That began an adventure that is still going on, an adventure that has led to all sorts of activity on the part of students, faculty and alumni. We have done all the things that quite unprofessional plant collectors generally do. We have rooted cuttings, grafted rare trees, poured over nursery catalogs by the score, exchanged trees, begged trees, collected trees from the wild, imported trees from England, even purchased seeds (some infertile) and attempted to grow our own trees. We have drawn maps, made card catalogs, kept a diary, issued information leaflets. In all this work, we have made as many mistakes and had as many accidents as it is possible to have. We have had grass fires; we have lost scores of labels; we have made errors in identification; we have bought trees under one name and had them turn out to be something else; we have drawn inaccurate maps; we have lost trees in our nursery by careless cultivation.

Of course, at the beginning we laid out plans that turned out to be too grand. Once I went to Boston and after a very encouraging talk with Dr. Sargent at the Arnold Arboretum went out to see the trees there. After three days of checking, I came back to the office with a list of the species to add to our collection. Dr. Sargent asked, "How many acres do you have?" "About twenty", I replied. "And how many trees do you already have?" Proudly I told him we had about two each of 250 species. "I am very sorry to disappoint you", said Dr. Sargent, "but the Arnold Arboretum will not help you. Go home, cut down half your trees, and double your acreage. Then, we shall see what we can do."

IT was a shock, but, of course, he was right. Since then we have increased our acreage somewhat, but we are still cutting down trees we once thought had plenty of room. It is interesting now to look back on the steps we took to scale down our early objectives. First, we decided not to plant large trees such as ashes, hickories, the larger maples (we did plant some oaks). Then, we decided to omit the poplar and willows. We decided a dozen magnolias would do instead of all of them. We decided to confine our collecting to trees and omit most of the shrubs. We decided not to collect horticultural varieties. Finally, we decided to specialize in conifers.

There are now between 175 and 200 species of conifers at Westtown, including 39 pines, 28 spruces, and over 30 firs. The general tree census runs close to 450 species, though naturally enough this includes the native forest species and the general plantings all over the campus. The firs have a special meadow of their own.

I really don't believe the Arboretum would have pulled through the 1920's, if it had not been for the generous support of the man who headed up the campus sub-committee of the General School Committee. He was William E. Rhoads, of Moorestown, N. J. Seeing the need to control volunteer growth, he hired two Italians, supplied them with 120 boxes of dynamite and told them to get rid of the stumps. They must have worked for six months and the noise of exploding dynamite became as monotonous as the school-bell system. Then the ground was thoroughly and repeatedly harrowed and finally seeded to grass. It was in good shape when the time for planting came around. In all this we were most fortunate. Our trees have grown magnificently, for they were planted in virgin soil which had never been exhausted by any farm crop.

One unfortunate influence I have not mentioned, the mowing machine. A field mower can clip a young tree as neatly, as if it were only a blade of grass. Ten or a dozen rare species have been deleted by this demon. The Brewer's spruce is a rare tree, a native to the Siskiyou Mountains on the California-Oregon border. It is not for sale by any American nurseryman. We imported two from England. One died from too much formaldehyde fumigation by the Plant Quarantine Station in Hoboken. The other lived two years in the nursery and was set out in the Arboretum, where the mower quickly disposed of it. The Brewer's Spruce does not produce root shoots. In the meantime, the U. S. Department of Agriculture had put all European spruces on the quarantine list. At the time we imported our trees, Haverford College had also imported one. Theirs had been somewhat neglected, but it was still alive. We planned to graft from it, obtained stock and went to get the scions, only to find the rare little tree had disappeared from the college nursery. A frantic check-up ensued. A week later, it was discovered that a faculty member who wanted some evergreens for his home had taken the rare little tree under the impression that it was a hemlock. Scions have now been secured and the grafting on Norway spruce has been done.

It's a nice hobby, collecting trees, especially if it is in connection with an endowed institution. Not long ago, I saw a list of the botanic gardens of California and read the sad information that three or four quite well-known collections were now broken up, on account of the death of their former owners and the lack of interest (or principal) of their heirs. But the endowed institution usually lives on; and while those who build arboretums realize they will hardly live to see their trees mature, they know that someone will probably take up the work when they lay it down. Someone may even erect a tablet with dates and names — though nobody ever knows what may happen to the labels on the trees.

Sansevieria

Lengua de Vaca or Bowstring Hemp

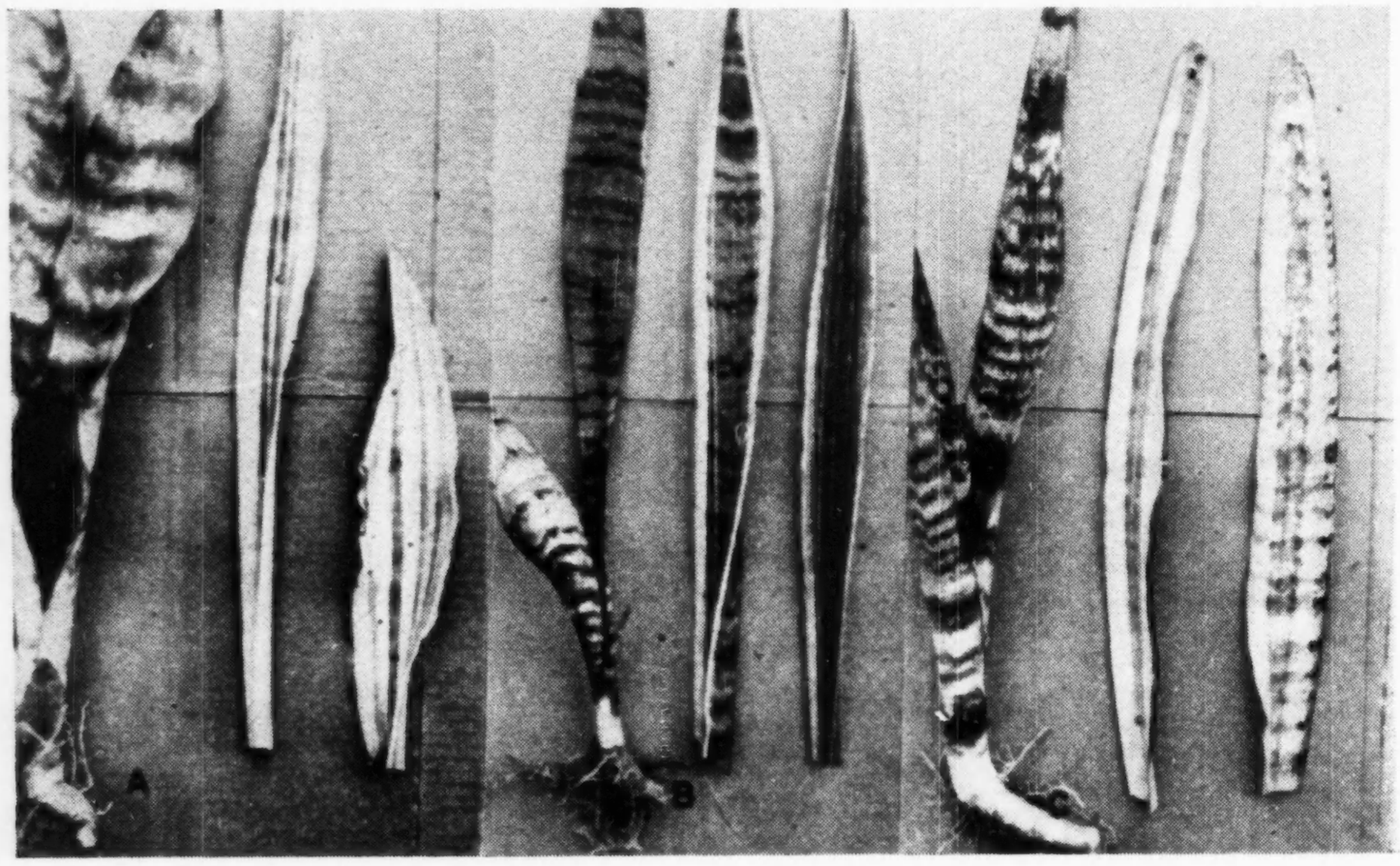
By J. Frank Joyner and
Edward O. Gangstad

THE sansevieria plant has a romantic past. It has served many masters and visited nearly every habitable part of the globe. The genus, described by Thunberg in 1794, and named after the early naturalist, Raimond de Sangro, Prince of Sansevierio, born in Naples in 1710, has more than fifty recognized species. Most of the species are indigenous to Africa, but some are reported along the coast of Arabia, India and Ceylon. Species have been distributed from these areas to other parts of the world by early emigrants and commercial tradesmen.

The plant is highly valued by primitive peoples for its strong, soft fibers. Aboriginal tribes of Zambesi call the fiber of *Sansevieria thyrsiflora* Thunb. (*S. guineensis,* Willd) "Konje" and the natives of the Malabar coast, "Katu-Kapet". In Ceylon, the fiber of *S. zeylanica* Willd is know under the Singhalese name, "Neyanda" and the fiber of the same or similar species is known in India under an ancient Sanscrit name of "Morova". Today, these fibers are commonly referred to as bowstring-hemp according to the area of origin, because they have been universally used by native peoples for making bowstring. The fiber is also used for coarse fabrics, baskets, fish nets and other handicraft.

The sansevieria plant is better known to the civilized world as an ornamental and is quite universally cultivated for this purpose. The Spanish refer to the mottled, flat-leaved species as "Lengua de Vaca" or cow's tongue. In some parts of the United States, the plant is known as mother-in-law's tongue; and is sometimes referred to as the snake plant.

Sansevieria was probably introduced into Florida during a period of Spanish colonization from 1765 to 1820. The missionaries who accompanied or closely followed the settlers, were often great lovers of plants and it is probable that they introduced sansevieria with other ornamental plants. It appears that different species were introduced into different areas at different times. *S. longiflora* Sims is cor



Left: Basic species A, *Sansevieria guineensis* Willd. B, *S. Laurentii* De Wildem. C, *S. trifasciata* Pr. and their yellow and white chimeral variations. Below: *Sansevieria thyrsiflora* growing wild along the Indian River at Micco, Florida.

monly found in the old Spanish settlements on the West Coast at Key West, the port areas of Tampa and Cedar Key, and the inland routes northward to St. Augustine and southward to Sebring and Arcadia. *S. thyrsiflora* is commonly found throughout areas of a somewhat later development on the East Coast from 1800 to 1850, along the Indian River from Stuart north to Daytona Beach and from Stuart south along the coast down to the Florida Keys. *S. trifasciata* Prain is found scattered over the State, but is most concentrated in the Central West Coast area. *S. trifasciata* var. *Laurentii* (de Wilden) N. E. Brown, the most common ornamental species, is distributed over the entire state in a more or less random manner. *S. cylindrica* Bojer and other cylindrical species appear to have been introduced at a much later date and are largely limited to the lower East Coast from West Palm Beach to Miami, which was largely settled during a period of expansion from 1850 to 1900.

These introductions have produced a peculiar pattern of distribution, for *S. longiflora* which has been shown to be very susceptible to cold damage, is located in the northern part of Florida. It persists in protected areas near present or abandoned buildings and has shown little tendency to escape to the wild. *S. thyrsiflora,* which has somewhat more cold tolerance than *S. longiflora,* is distributed over the southern part of the state. It has, however, escaped to the wild in many places and continues to persist in dense growths, particularly along the Indian River. *S. trifasciata,* which has been shown to have the most cold tolerance, has remained concentrated in the warmer central West Coast area. It

Experimental planting of *Sansevieria trifasciata* at Indian Town, Florida, for fiber production with planter designed by Mills H. Byrom
Bureau of Solis and Agricultural Engineering;
U. S. Department of Agriculture.

has not escaped to the wild as much as *S. thyrsiflora,* possibly because it was introduced at a later date and because it is a more domesticated species.

The species of sansevieria most commonly grown as ornamental plants are those which have yellow or white longitudinal stripes of chimeral tissue. These yellow or white chimeral variations occur as regular mutants at a frequency of about one to every thousand vegetative plants in *S. thyrsiflora, S. trifasciata* and *S. trifasciata* var. *Laurentii.* This characteristic has undoubtedly been acquired under cultivation; it is difficult to see how it might have any survival value in the wild.

The hard fibrous margin, so characteristic of most species of sansevieria, is much reduced in *S. thyrsiflora* and is entirely absent from *S. trifasciata* var. *Laurentii* and *S. trifasciata.* It is assumed that this fibrous margin of the leaf which had some special survival value in the wild, has been partly or wholly lost under cultivation.

There have been many attempts to harvest the wild growth of cylindrical species of sansevieria in Africa for their fiber on a commercial scale. In general, these attempts were not successful. The round leaf types do not recover well after cutting, so it was soon necessary to go far afield to gather new material.

More recent attempts have been made to cultivate sansevieria for fiber production. Studies of the Department of Agriculture in cooperation with the Florida Everglades Experiment Station indicate that there are considerable possibilities in South Florida for annual harvesting of such broad leaf species as *S. longiflora* and *S. liberica,* Gèr et Labr. and two or three year harvesting of the narrow leaf species such as *S. trifasciata.* The fiber is considered of value for marine cordage, because of its pliability and resistance to weathering in salt water spray.

President Truman's address to the nation on December 15, 1950, and his proclamation of a national emergency have brought each individual, every institution and all industry face to face with our critical situation and have caused them to take stock of how each may contribute fully to the defense of the United States and other freedom-loving countries of the world.

To the casual observer, a botanical garden may appear a place for peaceful pursuit of botany and horticulture, and to be far removed from the war-like programs lying ahead. Yet a backward glance of only five years reveals how well The New York Botanical Garden met the emergencies of World War II in widely diversified ways and rendered valuable assistance to the armed forces, to industry and to the defense programs generally.

In the March-April issue, we shall review briefly how The New York Botanical Garden, through its vast herbarium, its extensive library, its scientific laboratories and other facilities served our country then and shall serve it again in the perilous times ahead.

SHRUB AIDS In DETERMINING Extent Of OREBODY

By Leonard J. Buck

WITHIN the past three years, the United States Steel Corporation has found and proven one of the world s richest iron ore deposits in Venezuela, estimated by its engineers to be probably greater in quantity and higher in quality than all the ore the famous Hull-Rust mine in the Mesabi Range in the Lake Superior region has produced. The Mesabi Range aided in no small way to make possible the highly industrialized nation which the United States is and to give its people the highest standard of living in the world. Therefore, the importance of the United States Steel Corporation's discovery of iron ore in Venezuela must be self-evident.

This discovery has been much discussed and many articles have been written for popular magazines, describing its importance to our nation, but only brief reference has been made to the plant found associated with this ore deposit and the importance of this associated plant life in locating and determining the extent of this orebody.

In the December 1949 issue of the Journal of The New York Botanical Garden, it was the writer's privilege to submit some notes covering in a broad way the association of plants and minerals, which were known either through his own personal experience or through the personal experiences of recognized geologists in many parts of the world. In the above article, reference was made to an iron ore mine discovered in Venezuela and the association of a terrestrial orchid (*Epidendrum O'Brienianum*) with that particular property which is now being operated by the Bethlehem Steel Company.

Needless to say, as soon as the discovery of the new and larger United States Steel Corporation's Venezuelan iron ore field was reported, inquiry was made of John G. Munson, Vice President — Raw Materials, United States Steel Corporation of Delaware, through whose foresight its exploration, acquisition and development have been and will be carried on, as to whether the geologists in the field had noticed any association between the iron ore formation and any particular species of plant. Knowing the writer's interest in this subject, Mr. Munson informed him that the association of a certain shrub with the ore was of very practical assistance in the determination of the extent of the orebodies, since this shrub was evident even in the aerial survey work. It is through Mr. Munson's courtesy that a picture of the plant, *Clusia rosea,* but locally known as "Copei", has been secured. This shrub, shown in the accompanying illustration, grows from 20 to 50 feet high. Oddly it is an epiphytic plant like the orchid which grows on the Bethlehem Steel Company's deposit of iron ore in Venezuela. Its branches are usually horizontal, its leaves leathery, and it has white to pink flowers, nearly two inches across, in effect similar to the dogwood tree (*Cornus florida*).

The United States has enormous sources of energy — coal, oil and gas, good at the present rate of consumption for hundreds or possibly thousands of years. Other known mineral resources, however, are constantly being depleted. The area of the unexplored parts of the world, even South America alone, is so vast there is every reason to believe that some plants, while they may not be of any economic value in themselves, may lead to finding the minerals necessary to maintain and possibly improve our present high standard of living.

Geologists have recently noted that in traveling by air, they can with the aid of a geological map, even at heights from 5,000 to 10,000 feet, see a direct association between the type of rock and the vegetation which occurs in certain areas or at least observe the difference in character of the plants from one rock formation to another.

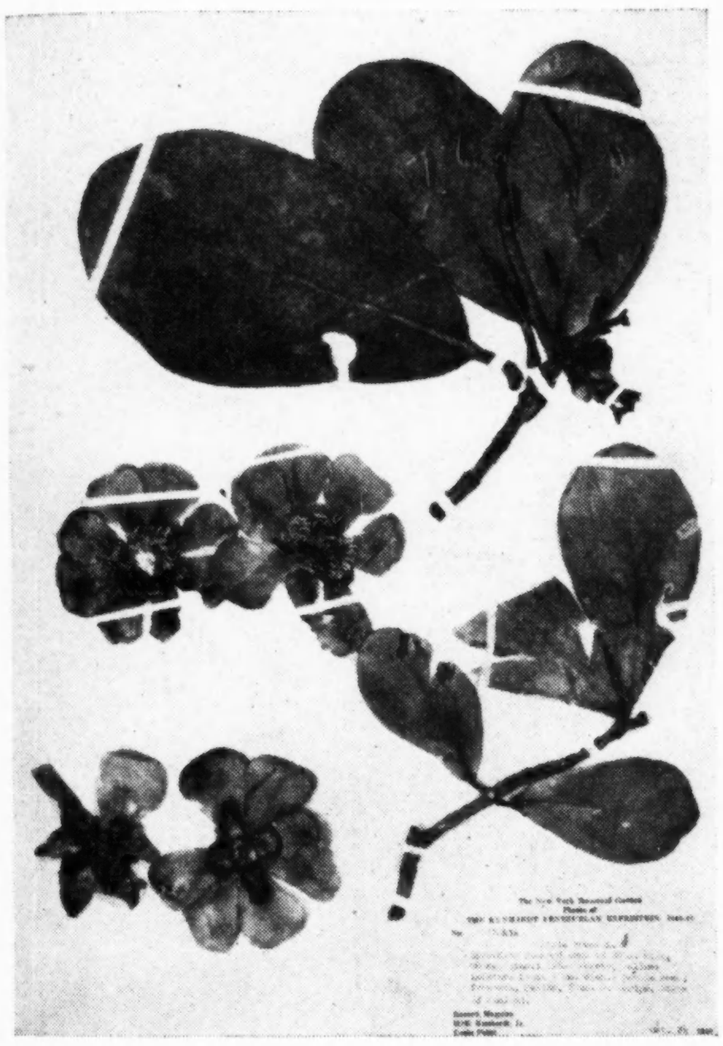
In recent correspondence, D. J. J. Marais, a well-known geologist of Johannesburg, South Africa, writes:

"The association of plants with certain strata is of course a well-known fact and we were often able to distinguish between various stratigraphic horizons in northern Rhodesia by virtue of the bush type growing on the different rock types. The differences in vegetation usually show up very well on aerial photographs and certain distinctive textures of vegetation can be

Churn drill on Las Tetas hill in the La Grulla district of Venezuela draws close to *Clusia rosea*, visible on the right. The U. S. Steel's iron ore exploration resulted in the discovery of Cerro Bolivar, a mountain of iron ore in Venezuela to which it recently obtained the rights to mine the ore.

observed; for example, on granite the trees appear to follow crisscrossing lines, probably joints. On the Archaen schists, the texture is a wiggly line type. On arkoses and other coarse clastics, the tree growth is usually considerably more vigorous than on shales. The dolomites generally have their own typical vegetation. Being able to recognize the various rock types by the indigenous vegetation typical of each is of considerable assistance in a country where outcrops are extremely rare."

Thus geologists, in mapping rock and land formations in search of one or another mineral, are now known not to be neglecting to observe the char-



Clusia rosea

The botanical specimen sent to the herbarium of The New York Botanical Garden from the Kunhardt Venezuelan Expedition, 1948-1949.

acter of plants distributed over the territories under examination. In view of this, the idea has occurred that if the presently available aerial photographs of vast mineralized but unexplored regions were studied intensively in connection with their plant growths, considerable assistance in the search for new deposits of ores and minerals would undoubtedly be obtained. The botanists and plant explorers of The New York Botanical Garden could profitably be invited to join with geologists representing various mining companies of the United States in the great effort being made to discover needed additional mineral reserves.

Seeds

Continued from page 6

one-half inch of crumbled, not too fine, sphagnum moss. This I firm down only enough to insure an even surface and over it place a piece of flannel. (Note: Use any canton flannel, or, if you wish, blotting paper, cut to fit tightly to the inside of the dish.) Then I dampen all this with water, but do not make "soggy-wet"; and I never permit it to become so.

The seeds to be tested are counted (in units of tens in order to make it easier to figure the percentage) and so placed on the cloth as not to touch each other. Another dish, or pane of glass, serves as a cover to check evaporation.

The seed germinator may be used to test more than one variety of seeds by drawing pencilled lines on the cloth, of sufficient size as to accommodate the desired number of seeds; or small strips of wood may be used to form these cribs.

If sphagnum is not available, just one or two layers of the flannel "will do the trick". Never use the cloth for a second test unless it is boiled, thus killing molds which would be detrimental to good results. However, "to play safe," and as it is more plentiful with me than canton flannel, I never re-use the sphagnum. I save it to mix into the soil for potting the seedlings, or as a mat in the bottom of the seed flats. My reason for using the flannel, on top of the sphagnum, is that it affords a smoother surface for small seeds and its light color aids in observing them. The cloth is not necessary in the case of large seeds, for they may be placed directly on the sphagnum.

A rectangular terrarium or an old aquarium is an ideal seed germinator. The same rules of preparation apply.

Keep the germinator in a dark room with the average temperature around 70°. Always remove the seeds as they sprout, as molds are apt to form on the now useless seed coats. "Keep count" on a piece of paper or wooden label placed with the corresponding seeds.

The percentage of germination will determine whether it is worth while to plant the seed. Unless they are rare, I seldom bother with planting seed that has a germination of less than forty percent. If I get a germination of say fifty percent, it is understood then that I must sow the seed twice as thick in order to insure "a good stand."

HERE, let me say that more gardeners should make use of sphagnum moss as a medium for the seedlings. The important factor in favor of its use is that seedlings are seldom attacked by that dreaded, damping-off fungus.

Also, it might be mentioned that it is useless to keep seeds of certain species of plants for more than one year. Seeds of some species must be sown as soon as ripe. Yet seeds of other species retain their vitality for years. Seeds of still other species even become better when kept for two or three years, and thus will produce healthier and heavier crops. This is true in the case of cucumbers and marrows.

You may have heard stories of seeds that were found in mummy cases, thousands of years old, that sprouted upon being planted. Actually, there is yet to be an authentic report of such an happening. However, scientific experiments have shown that lettuce seed properly stored for thirteen years will produce heads of larger weight than fresh seed. Among various weed seeds which had been buried for thirty years, one kind of seed sprouted within two days after it was brought to the surface. And seeds of the lotus were found to be viable, having been buried for at least one hundred and sixty years and probably for more than two hundred and fifty years, in a naturally drained lake bed in Manchuria.

From these examples, it is evident that different seeds possess different periods of longevity. Limitations as to space prohibit further narration on this subject. However, it is suggested that you who sow an appreciable amount of seeds each year, investigate this matter. You will find it exceedingly interesting and worth while.

Despite the great depth to which man has gone in delving into the mystery of the seed, the mystery is ever there before him. It is like "a Will-o'-the Wisp". He reaches out to clutch, only to find nothing within his grasp. Then, is it not sufficient to say, 'But only God can make a tree"?

For the Younger Generation of Gardeners

They Spring Up Like Mushrooms

Donald P. Rogers

WHEN a child, or a garden plant, grows so fast that between one visit and the next it seems to have become larger, we say that it has grown like a weed. When buildings suddenly appear where before none were to be seen, we say that they have sprung up like mushrooms. The difference in the words we use to describe rapid growth in size and unexpected appearance points to one of the plainest differences between mushrooms and those plants we know best, the flowers and trees.

A seedling, even if we begin to watch it when it has just broken out of its seed-coat, is plainly a litle seed-plant. It has a stem and leaves, as its parents had, and by pulling it up we can see that it has roots also. Day by day it becomes larger, puts out branches and more leaves, and finally forms flower-buds, whose growth is as gradual as that of the other parts. After flowering the petals fall away, and from the flower slowly develops the fruit — a seed-pod, or berry, or grain, according to the kind of plant. In the fruit are seeds like those from which the plant first sprang.

A mushroom, if it is one of the commoner kinds that springs from the soil, does not appear until it is already well grown. When we first see it, it is likely to have a stalk and cap, the cap cone-shaped like an umbrella or flat like the seat of a soda-fountain stool, and the stalk in the place of the post on which the stool is placed, or like the handle of the umbrella. On the underside of the cap are what are called gills — thin sheets of mushroom flesh fastened by one edge to the cap, and running out from the stalk in all directions like the spokes from the middle of a wheel. At its foot the stalk may be set in a cup, and part way up it may wear a ring of thin, soft material, like a sleeve, or loose like a bracelet.

All of these parts belong to the mushroom, and all of them were formed under the soil, or at the surface of the ground, or among dead leaves or living grasses. They were completed out of sight, and while there was no sign that a mushroom was about to spring up. Not only the parts large enough to see — the stalk, cap, gills, cup, and ring — but in fact the tiny, invisible cells of which the body of the mushroom (like the bodies of most living things) is made up, were formed while the mushroom was hidden and very small. The cells have different shapes, but we can think of one as looking a little like a glass jar with a glass lid. Each cell has an outside wall, thin, tough, and able to stretch. Inside the wall, top, bottom, and sides, is a layer of jelly-like material which is the only really living part. And inside the living material is a droplet of water.

While the mushroom is small, the water droplets form only the smallest part of the cells within which they lie. But sooner or later, perhaps during or just after a warm rain, the whole little mushroom takes on water. Each cell swells, the wall stretching, the living lining forming a thinner and thinner layer, and the water droplets coming to make up a larger and larger part of the cell. It is as though the mushroom were formed of millions of nearly empty balloons and all the balloons were blown up at once. Instead of air, these little balloons, the cells, are filled with water; but the growth comes about in the same way. The tiny stalk that was formed below ground thickens and stretches out, pushing the cap out of the soil and into the air. The cap becomes wider and spreads out, like an opening umbrella. The gills, which were packed together, are pulled apart by the widening cap.

We are apt to think of a mushroom as an odd sort of plant — to compare a mushroom, let us say, to an apple tree. Really, it is not a plant, but only a fruit, and much more like the apple. It is the fruit of a kind of living thing we call a fungus. On both sides of each gill are formed thousands of tiny cells, so small that without a microscope we can never see them. These are the spores, and they have the same place in the life of a mushroom that seeds have in the life of the apple. Although we cannot see a single spore, if many are collected, on a leaf nearby, or on a piece of paper which we placed below the cap of a mushroom, they can be seen as a layer of powder or dust. The color of the spore powder is different in different kinds of mushrooms. It may be white, pink, rusty, chocolate-color or black. We may need to learn the color of the spores if we are trying to find the name of a mushroom.

When the mushroom has shed its spores, it has done what it was formed to do, and it dies, or rots away. Many of the spores are carried by winds to places far from the mushroom, and some may be washed away by water. Most of these fall in places where no mushroom could ever grow, and like seeds on a sidewalk, are wasted. But a few may by chance fall where food, water, and warmth are all just right, and there they start to grow. And here we see another great difference between the mushroom and the flowering plant. A seed has a tiny plant folded up inside it, ready to grow. A mushroom spore has no undeveloped mushroom inside. It is a single cell — a wall, a lining of living material, and a drop of watery sap. And when it swells and begins to grow, it forms not a little mushroom, but what looks like a thread. The thread is made of many cells, end to end — like a single row of fruit jars, with the bottom of one touching the top of the next. The thread grows longer, branches and branches again, and pushes out through the soil. It may reach out to a distance of fifty or a hundred feet from the spore, and fill a space as large as a city lot.

It is this tangle of tiny threads that we must compare to the apple tree. The tree, not the apple, is the plant. The threads, not the mushrooms, make up most of the fungus. The tree has roots to hold it in place and to take in water and other things needed for growth. It has leaves to make its food. It has a stem to carry food and water to all parts of the plant. The threads take in water, carry food and water from one part to another, and, most important of all, take in all of the food that the fungus uses.

Green plants can make their own food, out of water from the earth and gases from the air. A fungus cannot make its own food, but, like animals, must live on food already made by other living things. If it grows in soil, its food comes from the dead leaves and other plant parts in the soil. Some mushrooms grow directly on trees; and these use the food stored in the wood of the tree. The threads of the fungus can digest food — that is, change it so that it can be used by the fungus — much as animals do. We are apt to say that a fungus is growing on rotting wood, or rotten leaves. What we should say is that it grows *by* rotting wood or leaves. It is because the threads of the fungus have digested them, that the plant parts decay.

As the network of threads grows it gathers up more and more food. After a time — a year, ten years, or a hundred years — it has grown large enough, and stored enough food, to fruit. Then some of the threads branch and twist about repeatedly in a small space, so that a tiny ball is formed, at first just large enough to see. Inside this ball some of the threads become packed together side by side to form a little stalk. Others make up the cap. And so a whole mushroom is built up of branched threads, packed into a sort of felt. We call this a mushroom button. When the little mushroom finally begins to grow large, it is the great mass of threads, spread out through the soil, that has brought to it the material of which its cells are made. And the water to blow up the cells comes also from the threads.

There are probably as many kinds of mushrooms and other fungi in most places as there are kinds of flowering plants. No one knows them all. People sometimes try to name all of them either mushrooms or toadstools. The idea seems to be that mushrooms are good to eat and toadstools are poison. But what people most often do is call the ugly kinds toadstools and the pretty kinds mushrooms. This is dangerous, for some of the ugliest, dirty, blackish mushrooms are good to eat, and some of the most beautiful will kill anyone who eats them. There is no safe rule for telling good from bad mushrooms, or toadstools. There is no rule for telling flowering plants that are good from those that are poisonous. Once we know what blackberries look like, we eat them safely. Once we learn to know poison ivy, we let it alone. There is no other way to treat mushrooms. For those who do not know the good from the bad, mushrooms are fine things to study, but poor things to eat.

Sir Joseph Banks

(*Continued from page* 18)

collected at Tahiti in 1789 never reached the West Indies. Two years later, in 1791, Bligh was again entrusted with a similar mission and this time successfully landed 300 trees at Jamaica and a like number at St. Vincent's.

As early as 1773, Banks introduced the plant we call bird of paradise to the Royal Gardens at Kew. He named this South African exotic *Strelitzia Reginae* in honor of Queen Charlotte, daughter of the Duke of Mechlenburg-Strelitz. In 1784, he sent the "sacred bean" of South Asia, *Nelumbium speciosum,* to Kew. Banks introduced *Hydrangea hortensis* in 1789, the same year that *Paeonia Moutan* was introduced from China. A year earlier, the fuchsia (probably *F. magellanica* from Chile) first became known to Kew.

Rosa Banksiae, sent to Kew by William Kerr from China and named by Robert Brown, was a great favorite in Banks' garden, where it flourished. Banks also grew the American cranberry on an artificial island at Spring Grove—as evidence of its successful cultivation, one hundred and forty bottles of cranberries were produced in 1813. Banks also raised apples, peaches, grapes, figs and strawberries, and popularized the system of mulching the last named crop with straw.

Joseph Banks was created a baronet in 1781, invested with the order of the Bath, July 1, 1795, and admitted to the privy council March 29, 1797. In 1802, he was made a member of the National Institute of France. He also held a foremost place in scientific societies: Linnean, Horticultural, Antiquarian, Merino, Arts and a host of others throughout Europe. His influence was recognized in Europe and America.

He intervened on behalf of foreign naturalists. When the collections made by La Billardiere during D'Entrecasteaux' expedition fell by fortune of war into British hands and were brought to England, Banks had them returned to France immediately. He refused to "steal a single botanic idea from those who had gone in peril of their lives to get them".

Sir Joseph Banks died on June 19,

Continued on page 32

PLANT VIRUSES AND VIRUS DISEASES. F. C. Bawden. 335 pages, illustrated, indexed. Chronica Botanica Co., Waltham, Mass.; Stechert-Hafner, Inc., New York City. 3rd (entirely revised) edition, 1950. $6.

This is an excellent book on plant viruses and a close reading will well reward even the virus specialist. Inevitably, there are the usual small errors. These, however, are not very serious and seem less numerous in this edition than in earlier ones. The author has a splendid mastery of the subject and he is to be commended for the free exercise of a fine critical faculty. But, in the reviewer's opinion, a serious weakness consists of minimizing the contributions by Stanley, and workers associated with him, on the isolation of tobacco mosaic virus and the identification of virus activity with the material isolated. As a result, their contributions on this particular problem, as presented in Bawden's book, appear almost negligible. Another weakness is the poor evaluation of the evidence that has existed for the multiplication of some plant viruses in their insect vectors. The author naturally tends to emphasize British work, which has been very considerable, and this has its advantages for American readers. However, there would seem to be no good reason for omitting Bawden's name and contributions from author index.

These comments are not meant to change the original remark on the general excellence of the book. Plant virology is fortunate in having such a lucid exposition of the principles of the subject. Bawden writes fluently and well. His book will make worthwhile and enjoyable reading, not only for virologists, but for other scientists and for laymen. It is up to date and comprehensive. The illustrations are well chosen and well reproduced; the vignettes by Miss Hilde de Vries, most artistic. This reviewer would like to cast his ballot for a leafhopper vignette in the next edition.

L. M. Black
Brooklyn Botanic Garden.

EXPERIMENTS IN GENERAL BIOLOGY. Graham DuShane and David Regnery. 182 pages, illustrated by Annette Eggers Algard. W. H. Freeman & Co., San Francisco, Calif. 1950. $2.00.

Experiments in General Biology by Graham DuShane and David Regnery is an excellent laboratory manual, stimulating for accuracy, neatness and thoroughness. It is most efficiently organized and prepared to the advantage of the student using it. The experiments are arranged into 24 sections under the major subjects comprising General Biology for college students. Part I to Part III pertain to animals or zoology; Part IV deals with plant life or botany, and Part V with genetics, ecology and evolution. Each section has explanatory remarks in general, followed by precise suggestions on laboratory observations, experiments, and stimulating questions for discussion. An extremely efficient feature of the bound Experiments is the perforations and the standard loose-leaf holes of each page; this facilitates the removal of any exercise or subject and permits the rebinding of the instructions with additional notes and figures recorded and tabulated by the students.

G. L. Wittrock.

HANDBOOK OF ATTRACTING BIRDS. Thomas P. McElroy, Jr. 163 pages, illustrated by Lambert Guenther; bibliography. Alfred A. Knopf, New York. 1950. $2.75.

The author, curator of the Pequotsepos Wildlife Sanctuary at Mystic, Connecticut, has written a fine, practical book on attracting birds that includes methods of artificial feeding, planting trees, shrubs and vines for birds, building birdhouses, attracting game species and waterfowl, care of young and injured birds, bird study, bird photography, bird-banding and a chapter on starting a public sanctuary. Anyone who attracts birds will want this useful, well-illustrated book.

John K. Terres
National Audubon Society

MOSSES. Paul Richards. 40 pages, 3 figures, 16 color plates. A King Penguin Book. Allen Lane, Inc., Baltimore, Md. 1950. 75c.

A brief and delightful introduction to the mosses, with a simple and accurate account of their development, structure, and place in nature, and suggestions for making a moss collection and a moss garden. The plates are taken from Hedwig's classic on the mosses; not all the species illustrated grow in America, but the generic characters are as useful here as in Great Britain. The book is well written and beautifully printed. After reading it one is tempted to echo the question offered by Dr. Geneva Sayre as the title for one of her lectures at the Garden: "Why be a rolling stone?"

Donald P. Rogers.

MORPHOLOGY AND TAXONOMY OF FUNGI. Ernest Athearn Bessey. 791 pages, illustrated, indexed. Blakiston, Philadelphia, Pa. 1950. $7.

This clearly written, well-illustrated and reasonably up-to-date text is quite an enlargement over Dr. Bessey's earlier *Textbook of Mycology*. It follows essentially the same taxonomic treatment found in the earlier publication. Several features of particular interest to students of the fungi may be mentioned here. At the end of each chapter, there are valuable keys to the orders, families and genera of the particular group of fungi treated in the chapter. This feature alone makes the book an indispensable aid in teaching and research. In addition, there is a good bibliography at the end of each chapter. Furthermore, the last chapter in the book gives an invaluable list of references for the identification of all the main groups of fungi. There is also a chapter in which the various theories of phylogeny of fungi are discussed.

The taxonomic system followed by Dr. Bessey may in some particulars be confusing to those not already familiar with it. For example, in the classification of the Ascomycetes, the author places the Pezizales near the beginning of the series, while orders such as the Aspergillales, which are generally considered more primitive, are placed near the end. In the classification of the Basidiomycetes, undoubtedly too much emphasis is placed upon the importance of spindle orientation in the basidium, and only two orders of Hymenomycetes are recognized—Polyporales (stichobasidial series) and Agaricales (chiastobasidial series). One finds families such as the Exobasidiaceae placed in the Polyporales, and Boletaceae in the Agaricales. The unreliability of spindle orientation as a primary character in the classification of these fungi has been frequently demonstrated. Nevertheless, in view of its many advantageous features, the text is readily recommended to students of the fungi as a valuable aid in teaching and research.

Lindsay S. Olive
Department of Botany
Columbia University

THE CHEWING GUM TREES. Ruth Bishop Juline. 122 pages, illustrated by Harlyn Dickinson. Lothrop, Lee & Shepard, New York. 1950. $2.50.

The Chewing Gum Trees, by Ruth Bishop Juline, with color illustrations by Harlyn Dickinson, relates the story of two children who accompany their father into the jungle in southern Mexico to see how he earns his living in the chicle industry.

Adventures and incidents of family life, as well as a descriptive account of getting chicle from the trees and making it into gum, make this an interesting little book for young readers.

WILD FLOWERS. Paxton Chadwick. 58 pages, 61 illustrations in color. A Puffin Picture Book. Allen Lane, Inc., Baltimore, Md. 1950. 35c.

FLOWERS OF THE MEADOW. 34 pages of text, 24 plates in color, drawn by Robin Tanner. A King Penguin Book. Allen Lane, Inc., Baltimore, Md. 1950. 75c.

WILD FLOWERS AT A GLANCE. M. C. Carey & Dorothy Fitchew. 275 pages, illustrated, indexed. Pellegrini & Cudahy, New York. 1950. $2.75.

These three English wild flower books have much interest and charm because of the excellence of their illustrations. The first and second will be particularly desirable to those who enjoy wild flower pictures or who know our native flora and would like to compare the same or related species which delight our English cousins.

The first book at its modest price can hardly be refused by anyone with even only a mild interest in wild flowers. The second book is the fourth in a series on ecological groups of British wild flowers with even finer illustrations than found in its predecessors.

To students of our native flora, the third book should be particularly valuable. It is a good survey of the commoner species found in England, but of greater importance is the description of habitat and blooming time of such species that have emigrated and obtained a foothold here as well as American species that illustrations are adequate and helpful. have traveled to England. The color Henry K. Svenson of the American Museum of Natural History has written an introduction to this book particularly addressed to American readers. It tells how these British plants got here and established themselves and this little piece is of particular value to those interested in the travels of seeds.

Samuel H. Gottscho.

RECENT ACQUISITIONS TO THE LIBRARY

Problems of Cytology and Evolution in the Pteridophyta by I. Manton. Cambridge, University Press, 1950. $8.50.

The Fresh-water Algae of the United States by Charles M. Smith. 2d ed. N. Y., McGraw-Hill Book Co., 1950. $10.00.

Diseases of Cereals and Grasses in North America (Fungi, except Smuts and Rusts) by Roderick Sprague. N. Y., Ronald Press Co., 1950. $7.00.

Plant Breeders of the Future; Introductory Counsel for Students by Gordon Haskell. London, Biological Press, 1950. 3 shillings.

Nuts; their Production and Everyday Uses by F. N. Howes. London, Faber and Faber, 1948. 18 shillings.

Plants and Beekeeping; an Account of Those Plants, Wild and Cultivated, of Value to the Hive Bee, and for Honey Production in the British Isles by F. N. Howes. London, Faber and Faber, 1948. 12 shillings, 6 pence.

The Clove Tree by G. E. Tidbury. London, Crosby Lockwood and Son, 1949. 18 shillings.

The Propagation of Plants by E. J. King. London and N. Y., Hutchinson's Scientific and Technical Publications, 1950. 16 shillings.

The Coming of the Flowers by A. W. Anderson. London, Williams and Norgate, 1950. 10 shillings, 6 pence.

Membership in

THE NEW YORK BOTANICAL GARDEN

and what it means

TO THE INSTITUTION, membership means support of a program that reaches several hundreds of thousands of persons annually.

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A subscription to The Garden Journal (published bi-monthly) and to Addisonia (issued iregularly).

Admission to Members' Day programs and use of the Members' Room also at other times.

A share of plants when made available for distribution. (These plants may include the Garden's new introductions into horticulture.)

Personal conferences with staff members, upon request, on problems related to botany and horticulture.

Free anouncements of special displays, lectures, broadcasts, programs, and other events.

A membership card which serves as identification at special functions at The New York Botanical Garden and also when visiting similar institutions in other cities; which allows 10 free rides upon The Garden's tractor-train, *The Floral Flyer*. Also, on presentation of membership card, parking fee on weekends is waived.

Garden clubs may become Affiliate Members of The New York Botanical Garden, and thus receive certain privileges for the club as a unit and others for individual members. Information on Garden Club Affiliation will be sent upon request.

Business firms may become Industrial Members of The New York Botanical Garden. Information on the classes of Industrial Membership and the privileges of membership will be sent upon request.

Classes of membership in The New York Botanical Garden are:

	Annual Fee		*Single Contribution*
Annual Member	$ 10	Member for Life	$ 250
Sustaining Member	25	Fellow for Life	1,000
Garden Club Affiliation	25	Patron	5,000
Fellowship Member	100	Benefactor	25,000

Contributions to the Garden are deductible from taxable incomes and in computing Federal and New York estate taxes.

A legally approved form of bequest is as follows:

I hereby bequeath to The New York Botanical Garden, incorporated under the Laws of New York Chapter 285 *of* 1891, *the sum of*.....

Gifts may be made subject to a reservation of income from the gift property for the benefit of the donor or any designated beneficiary during his or her lifetime.

All requests for further information should be addressed to

THE NEW YORK BOTANICAL GARDEN

Bronx Park, New York 58, N. Y.

Address your questions to *The Question Box, The Garden Journal of The New York Botanical Garden*, Bronx Park, New York 58, N. Y.

Q. I should like to learn how to distinguish edible mushrooms from the poisonous variety. Do I understand that the edible remain white and don't change color, while the poisonous are black outside and even turn black when torn apart?

A. There is no general rule for distinguishing edible from poisonous mushrooms that will not lead to most unpleasant consequences, even though many such rules have been proposed and widely believed. The rule quoted would label as poisonous some of our best edible mushrooms, such as the inky-caps, and would indicate the edibility of at least two species which are certain to produce serious, and usually fatal, poisoning.

D. D. Rogers, Curator.

Q.We have an order for a wedding cake to be decorated with pikake flowers; one of the principals of the wedding comes from Hawaii. What is pikake and what does it look like?

A. Pikake is the Hawaiian name for *Jasminum Sambac*. The flowers look much like small flowers of the paper-white or the Chinese narcissus. They are strung for leis with the thread running lengthwise through the flower, so that the base of each flower is partly enclosed to be the incurved petals of the next.

D. P. Rogers, Curator.

Q. The leaves on my gardenia plant are green and shiny and look quite healthy, but the flower buds turn yellow and drop off just before they open. What causes this and how can I prevent it?

A. Bud-drop of gardenias is a non-parasitic disease, that is, fungi, bacteria or insects are not involved. It is thought to be caused by a combination of several unfavorable environmental conditions, including a very dry atmosphere, excessively high temperature, overwatering and insufficient sunlight. These conditions are conducive to the production of soft growth which, in turn, favors bud drop.

Increasing the humidity in the room, lowering the night temperature to 62° F, watering the soil less frequently and providing additional light during the winter will help to produce the kind of growth that is less apt to result in bud drop. Growing gardenias to full bloom in the average home is an extremely difficult job.

P. P. Pirone, Plant Pathologist.

Q. Are the new insecticides more effective than arsenate of lead for controlling Japanese beetle grubs in lawns?

A. Pound for pound DDT is about 100 times more toxic to these insects than lead arsenate. Chlordane appears to be 70 times more toxic than DDT.

P. P. Pirone, Plant Pathologist.

Q. I should like to grow some "mums" outdoors next spring. How do I go about it? I have about one-half acre of good soil and "mums" do nicely in this locality. I note you say the "mums" are planted from cuttings or slips.

A. Hardy chrysanthemums grow well in any soil that will produce good vegetables. They need full exposure to sunshine. The plants are propagated either by cuttings taken from stock plants that are brought into the greenhouse in February or March, or by divisions of the old plants made in the month of April.

For field cultivation, either divisions or small plants raised from cuttings may be set about three to three and one-half feet apart with eighteen inches to two feet allowed between the plants in the rows. When the young plants are about six inches high, pinch out their tips and continue to pinch out the tips of all branches when they are six inches long, until the end of July, when all pinching should cease.

Keep the plants free from weeds, either by cultivating regularly or by mulching. Staking or other suitable means of support will be needed for the taller varieties. Application of a complete vegetable garden fertilizer may be needed during the summer to encourage growth, for chrysanthemums are rather gross feeders. Spraying with insecticides or fungicides will probably be necessary to control aphids and other pests.

T. H. Everett, Horticulturist.

Q. I have on my place two trees—*Albizzia julibrissin rosea*—which I planted as tiny seedlings fifteen or twenty years ago. They have grown and flourished, weathered the 1938 hurricane which was very bad on this south shore of Long Island, and are covered with bloom every season. I attribute their continued good progress to the fact that I planted them in a line of black locusts, whose leguminous roots have furnished a never-failing nourishment which they apparently enjoy.

During the last two seasons, the two trees have put up numberless seedlings and it is about these that I ask your advice. I should like to grow them to a good transplanting size and should like to know the best way to carry them over the winter. I brought several into the house in pots, of which about half lived. I should like to transplant several to a location more visible from the house.

Here are my two questions: Do they need winter protection and if so of what character? In what soils do they best thrive since their friends, the black locusts, can't follow them?

A. As *Albizzia julibrissin rosea* itself is a member of the great legume family and so possesses nitrogen-fixing bacteria in its roots, I do not believe that the fact that your trees are growing near to black locust trees is responsible for their well-being.

The best method of handling young seedlings of this tree is to pot them carefully in small pots, containing a light sandy soil mixture. Great care should be taken not to damage the roots unduly in the potting operation.

The most satisfactory way of wintering young potted plants of *Albizzia julibrissin rosea* is to sink the pots to their rims in a bed of ashes or sand in a coldframe. If this is not available, I suggest sinking the pots in a bed of ashes or sand in a sheltered place outdoors and covering them with hay or leaves, after the ground has frozen. *Albizzia julibrissin rosea* seems to grow satisfactorily in any ordinary soil, provided it is well drained. However, I believe it prefers a soil of a somewhat sandy nature to one that is clayey.

T. H. Everett, Horticulturist.

Q. What is the scientific name of a American fiber plant which is often called "wild pineapple?" What is its value as a fiber?

A. *Aechmea Magdalenae*, known as "Pita Floja", is frequently referred to as "wild pineapple". It is found in the wild from mid-Mexico to Brazil. The natives have long used it in the manufacture of cordage, twisting the fibers by hand into cords and ropes. It appears to make a good canvas, owing to its high tensile strength which is 50 per cent greater than that of abacá. *Aechmea Magdalenae* shows considerable resistance to abrasive wear and to deleterious effects of water.

Elizabeth C. Hall, Librarian.

Q. When was the water-hyacinth introduced into this country? How serious is the damage done by this weed?

A. The water-hyacinth, *Piaropus crassipes* (*Pontederia crassipes, Eichornia crassipes*), is native of Brazil, but has spread to nearly all the countries in the world favorable to its development. The first authentic account of its appearance in the United States gives the date of 1884, and it is stated that the plant was shown as an exotic at the Cotton Centennial Exposition at New Orleans. Its beautiful bloom attracted many friends and it was soon cultivated in many of the southern gardens.

The plant made its appearance in Florida in 1890 and has since become an important aquatic pest, obstructing navigation, impeding drainage and destroying wildlife resources. An annual loss of five million dollars is said to be a conservative estimate for the state of Louisiana alone.

The water-hyacinth was officially recognized as a serious aquatic pest when Congress passed an act June 4, 1897, authorizing the Secretary of War to make an investigation. Control methods have met with moderate success in the clearing of navigation channels.

Elizabeth C. Hall, Librarian.

News, Notes and Comments

Christmas Displays at The New York Botanical Garden

Christmas came to The New York Botanical Garden on December 8, when Mrs. Charles Burlingham, assisted by Mrs. Donald B. Straus and Mrs. Wallace S. Whittaker of the Exhibition Committee, arranged fascinating scenes in the four display cases on the main floor of the Museum and Administration Building. These depicted Christmas costumes in colonial and modern America, Central America and Norway.

In the early American scene stockings were hung in the traditional manner from a period fireplace. Costumes, stockings and some of the toys were loaned by the Museum of the City of New York; the other toys have been in Mrs. Burlingham's family for generations.

Mrs. Colgate Grenoble decorated the tree in the present-day Christmas scene. In front of the fireplace a litle child sat, lost in the wonders of his Christmas toys. This figure was loaned by R. H. Macy & Company, as was the figure in the colonial Christmas.

The Central American display represented a community Christmas, with a procession of townspeople climbing a mountainside to visit the creche at the summit. The figures, sent to Mrs. Whittaker by friends in Colombia and Guatemala, ranged in size from about six inches tall to barely visible figures only half an inch high, as they wended their way up the mountainside.

Norway has a legend that on Christmas dwarfs come in the dead of night to tidy the house and yard and to bring good luck for the coming year. In the Norwegian scene, there were four of these whimsical little creatures. Mrs. Burlingham's Norwegian household staff made the trimmings for the Christmas tree and an eighty-year old Norwegian, now living in Brooklyn, carved a tiny milking stool for one of the dwarfs.

A beautifully executed creche held the central position on the main floor. Mary, Joseph and the wise men were effectively dressed by Mrs. Burlingham.

Then, on December 22, the special Christmas exhibition in the Conservatory was open to the public. In House No. 6 the courtyard of the inn at Bethlehem at the time of the Nativity was realistically portrayed. Parts of the inn and stable were reproduced and life-sized beautifully costumed figures of Mary, Joseph and the shepherds were grouped about the full-sized manger. Live animals were housed in the stable and straw, hay and husks stored for their use, as well as onions, garlic, cucumber and herbs for human consumption. In the courtyard were such trees and shrubs as were to be found growing around an inn in Bethlehem in those days. These included Cedar of Lebanon, green bay tree, olive, pomegranate and fig.

Like the other animals in the Nativity scene, "Giulia" appeared by courtesy of the New York Zoological Park. "Giulia" is a young Italian donkey which was bought by the children of the Udine province of Italy by contributions of about an American cent each. It was presented to the children of America at a ceremony at the Bronx Zoo on December 2nd. "Giulia" is a token of appreciation by the Italian children for Marshall Plan betterment of health and living conditions in their region.

House No. 4 was filled with a colorful exhibit of Christmas plants, including poinsettias, Christmas cherries and Christmas begonias.

Lambertus C. Bobbink

A great rosarian and an internationally known horticulturist passed away on December 7. This was Lambertus C. Bobbink of Rutherford, New Jersey, President of Bobbink & Atkins Nursery, which he founded, in 1898, with the late Frederick L. Atkins.

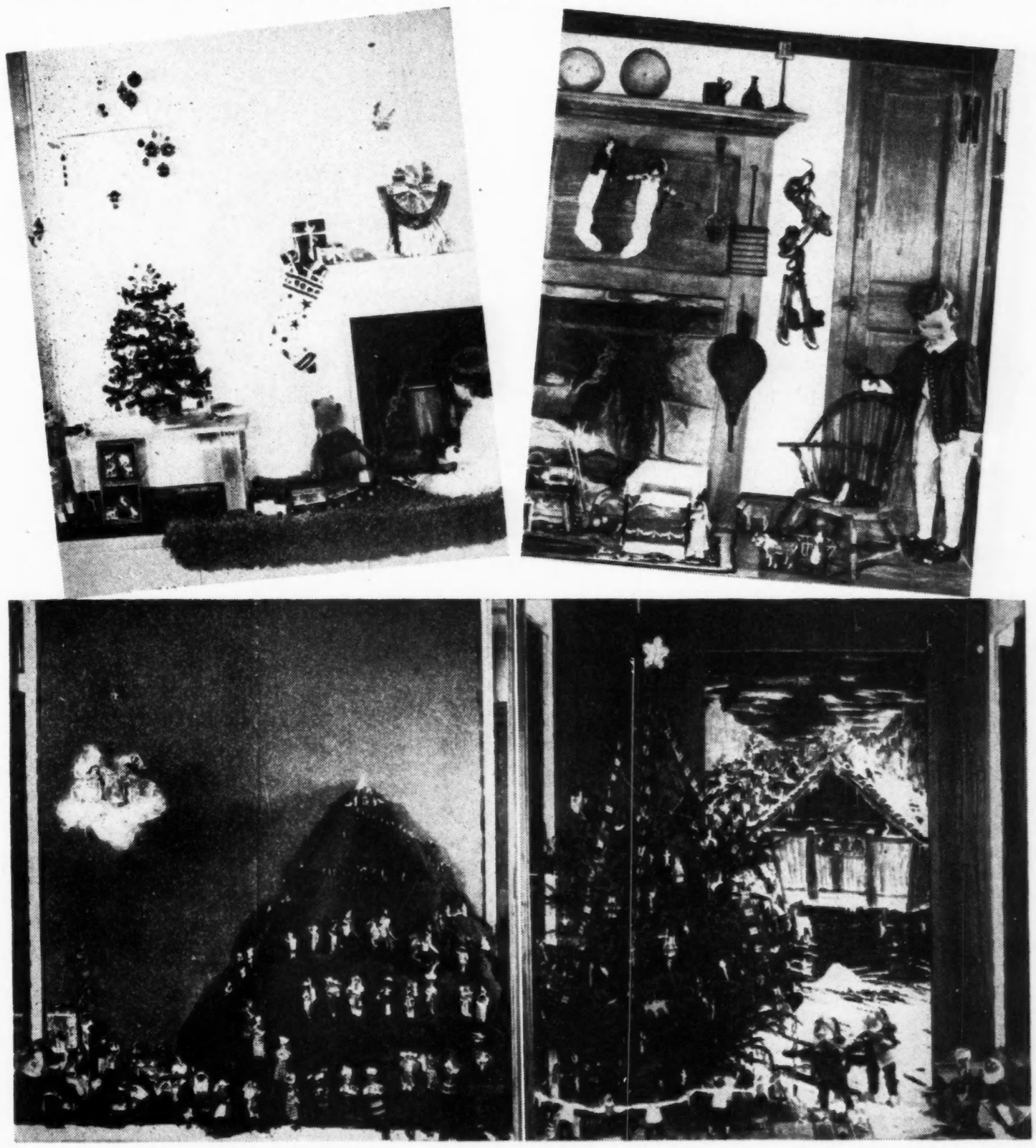
For many years Mr. Bobbink took a personal interest in the rose garden at The New York Botanical Garden, donating the majority of the 7,000 plants which it contains and serving as watchful guardian of their health and appearance. Each year, on Rose-Growers' Day, he conducted the visitors on a tour of the rose garden.

Mr. Bobbink was the first nurseryman to propagate hybrid tea roses on hardy understock. This method is now almost universally practiced. He also developed a strain of azaleas which brought him considerable acclaim in 1935, and introduced into this country many of the choice ornamentals grown in gardens today. His particular interest, however, was in the "old-fashioned" roses and he collected them from all parts of the world. In 1939 he contributed the plants for a border of "old-fashioned" roses in the rose garden of The New York Botanical Garden.

It was in that same year, 1939, that a bronze plaque in the rose garden was dedicated in honor of Mr. Bobbink as a man who had contributed more than any other to the widespread use and successful culture of the rose in America.

In 1945, Mr. Bobbink was the recipient of an award from the American Rose Society for "outstanding achievement and service to the rose". In 1947, the Men's Garden Club of America conferred on him the Johnny Appleseed award as the outstanding horticulturist in the United States. In 1948, he was awarded the Charles H. Totty memorial medal for his outstanding contributions to and achievements in horticulture.

Mr. Bobbink was born 84 years ago in Arnheim, Holland, the son of a nurseryman, and first came to the United States in 1895 to represent a group of Holland nurserymen. A year later he returned to this country to start his own nursery and "make America plant conscious". He had the satisfaction of realizing his ambitions, for during his long life he brought many horticultural riches to America.



Upper Left: Christmas in Modern America.
Upper Right: A glimpse of Christmas in Colonial America.
Lower Left: A Christmas procession in Central America.
Lower Right: The spirit of Christmas in Norway.

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Waialua, Oahu, T. H.

Hoblitzelle National Award in Agricultural Science

This award, which carries a $5,000 cash prize and a gold medal, will be made biennially starting this year, through the Karl Hoblitzelle Agricultural Laboratory of the Texas Research Foundation at Renner, Texas. The purpose of the award, made possible through Mr. Hoblitzelle, of Dallas, is to encourage and promote scientific investigations for the solution of unsound agricultural practice; to develop well-balanced, efficient agricultural systems; and to center the attention and interest of scientists and others upon the importance of agriculture in the nation's economy. Thirty-nine regional and three territorial committees will consider contributions in the fields of agronomy, bacteriology, biochemistry, biology, all phases of botany, chemistry, entomology, forestry, genetics, nutrition, soil science and veterinary science. To make a contribution eligible for award, the results of scientific research must have been published between July 7, 1948 and July 1, 1950.

Dr. William J. Robbins has been appointed a member of the New York Regional Committee, of which Dr. Sanford S. Atwood, Head of the Plant Breeding Department of the College of Agriculture, Cornell University, is chairman.

The June 1950 isue of "Lloydia", the quarterly Journal of Biological Science, contains an article entitled "A Survey of Plants for Insecticidal Activity". This survey was undertaken in 1939 as a cooperative investigation between Merck & Company, Rahway, N. J., and the New Jersey Agricultural Experiment Station and Rutgers University, and was for the purpose of determining what plants might yield new and useful insecticides.

The authors of the above article, Ralph E. Heal and Edward F. Rogers of the Research Laboratories of Merck & Company, and Robert T. Wallace and Ordway Starnes of the Department of Entomology, Rutgers, state that the identification of several thousands of plants could not have been accomplished without the cooperation of The New York Botanical Garden, which placed its resources, particularly its vast collection of herbarium specimens and its extensive library, at their disposal. This is just another example of the many avenues of activity served by The New York Botanical Garden.

Dr. Gleason Retires

Dr. Henry A. Gleason, who entered the service of The New York Botanical Garden on March 1, 1919, retired on January 1, 1951, at his request and by action of the Board of Managers. Throughout his association with the institution he served it in many capacities, as First Assistant, Assistant Curator, Head Curator, Assistant Director, Chief Research Associate and Curator, and for a brief period he also served as Acting Director. Dr. Gleason has been identified with the executive boards and editorial boards of many scientific and botanical societies including the Torrey Botanical Club, the Botanical Society of America, the American Society of Plant Taxonomists, the Natonal Research Council, the American Journal of Botany, Ecology, and was co-founder of the Botancal Review.

The manuscript for his book, *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada* is now in the hands of the printer. He is also author of *Plants of the Vicinity of New York.*

Letter From Dr. Bassett Maguire

Dr. William J. Robbins received a letter, dated December 10, from Dr. Bassett Maguire, just as this issue was going to press. We are happy to be able to keep our readers informed on The New York Botanical Garden-Kunhardt Expedition to Venezuela.

"Huachamacari, the 'House of the Gods' has been ascended. We've been on top for nearly a week now. The climb was not bad; it required only two intermediate camps between Culebra and the summit.

"The trail leads first up to and over a low escarpment several hundred feet high, then upward over a long forested talus to the base of the upper escarpment about 4,000 feet. The cliffs then are sheer for about 1,500 feet and completely ring the summit. Apparently only one approach is feasible. We came up a diagonal ledge which varies from a foot to thirty or more wide and is almost completely vegetated. Two hundred feet from the top, the ledge peters out. The final climb is almost vertical through a narrow erosion fissure. Here we had to haul our gear up about seventy-five feet by rope.

"The top is roughly circular and has a mean relief of some 1,500 feet, the low parts being the drainage outlets from which drop very high waterfalls. The central and highest or at least largest falls shear for about 1,500 feet. We've called this the 'Salto de Deos'. Another we've named 'Salto Maria Francesca' for Dick's (Richard Cowan) wife.

"The cumbre vegetation of Huachamacari is, as was expected, most closely related to that of the nearby Duida. Yet it has developed a strong endemic flora, but one not as pronounced as on more isolated tablemountains.

"We live in a dense elvan forest no more than twenty to thirty feet high but fully two storied. Much of the time we are enveloped in cloud mist and underfoot is a perpetual semi-peat bog. Our entire camp area is covered with a corduroy of small logs or we would constantly be in a mire of raw humus. It has rained about two centimeters a day since we've been here, so it never dries out. Minimum temperature at night reaches 56°, maximum in the day 79°. The creeks maintain a rather constant temperature of 62°.

"Living is hard, but conditions like this make the unique vegetation thrive. Our work shelter is fixed at one end to a new species of *Gongylolepis*, a tree composite. Another, a fine new *Stenopedus*, is at its side. We'll get much off this rugged, cloud-laden summit. Tell Dr. Gleason that we've got *Gleasonia* here — I think the Duida species.

"We plan to start down about December 25 and to leave Culebra on January 1. We'll spend a week on Yapacana before going up the Ventuari. On the completion of our work, we should have from twelve to fifteen hundred numbers."

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Collection: (1 ea. of 7 varieties) $6.00

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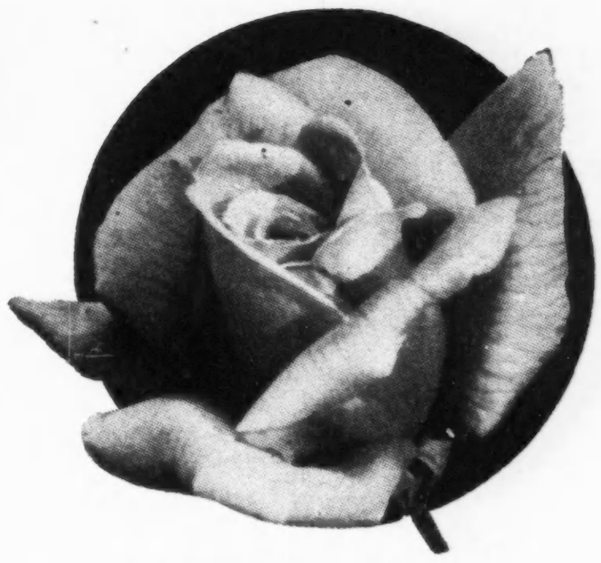
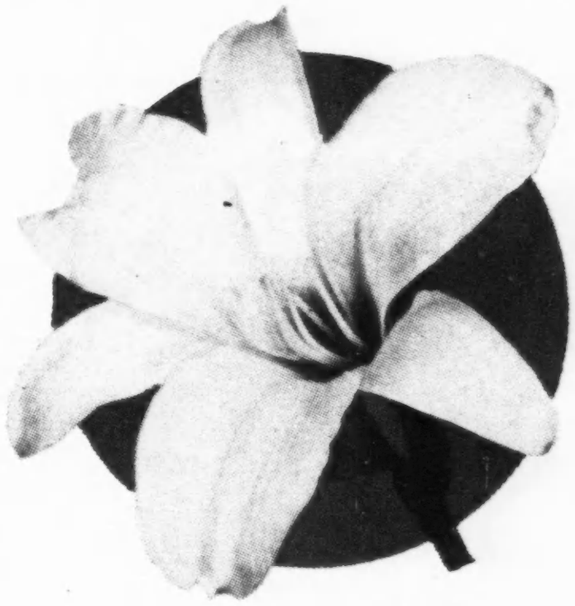
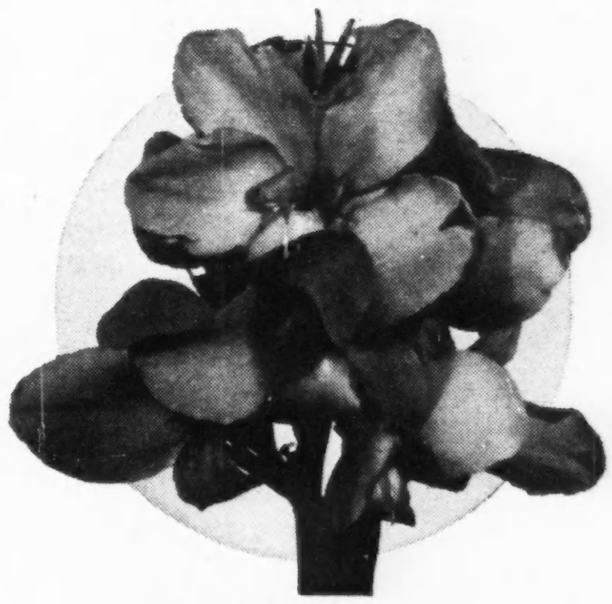


SUTTER'S GOLD, *Tea Rose*



DIDO, *Hemerocallis*



MIGNON, *Pastel Cannas*

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"Open House"

Mr. Charles B. Harding, President, members of the Board of Managers, and Dr. William J. Robbins, Director, held an informal open house for all of the employees of The New York Botanical Garden on the afternoon of December 21.

Theater Benefits

Two theater benefits were held, one on December 20 and the other on January 9, under the auspices of the Volunteer Associates of The New York Botanical Garden, with Mrs. Harold R. Mixsell serving as chairman of the committee on arrangements. The proceeds of these benefit performances of the Cole Porter musical "Out of this World" will aid the research laboratories of The New York Botanical Garden.

Staff Conference

A conference of the staff and students of The New York Botanical Garden was held on Friday afternoon, December 15, when Dr. Donald P. Rogers and Dr. H. W. Rickett reminisced about the Seventh International Botanical Congress in Stockholm. On January 19 Dr. H. N. Moldenke will speak on "Botanizing in Lapland", and Dr. E. H. Fulling will show kodachromes of Stockholm, Sweden.

On Radio

Miss Elizabeth Hall, Librarian, had an interview with Sidney Fields during his "Only Human" hour over WOR at 2 o'clock on Sunday, December 10.

Thomas H. Everett, Horticulturist of The New York Botanical Garden, was Dorothy Doan's guest on her "Vanity Fair" program, CBS-TV, on December 26. Mr. Everett gave a practical talk on the care of Christmas gift plants such as poinsettia, cyclamen, Christmas begonia, and Christmas cherry.

A 8:30 a. m., on December 27, over WCBS, Margaret Biggerstaff, Public Relations Director of The New York Botanical Garden, was a guest on the Margaret Arlen Show. Mrs. Biggerstaff described the many facets of this privately endowed institution.

Members' Day

Mrs. Jean Hersey gave a talk on "House Plants" at Members' Day, held at the Genealogical Society on December 7; and at the Members' Day program on the evening of January 17, Mr. Albert Burrage gave a talk on "A Garden for Gourmets".

1951 Winter Courses of Study

On January 8, Dr. H. W. Rickett started his class in General Botany II. This will be held for twelve consecutive Mondays, excluding February 12, from 8 to 9 o'clock. On the same evenings during the hour from 9 to 10 o'clock, Dr. F. W. Kavanagh will instruct a class in Soils and Fertilizers. On six alternate Thursday evenings, January 11 to March 29, excluding February 22, there will be a two hour class in the Cultivation of Greenhouse Plants. Mr. Joseph W. Tansey of Mt. Kisco, N. Y., is instructor. Miss Tabea Hofmann, one of America's foremost flower illustrators, will give another class in Flower Painting for Amateurs on Thursday mornings from 10:30 to 12 o'clock. The first class will meet on January 18 and every Thursday thereafter until March 15, excluding February 22.

Free Saturday Afternoon Programs

These programs were resumed after the Christmas holidays, on Saturday, January 6. They are held every Saturday afternoon at 3:30 o'clock in the lecture hall of the Museum and Administration Building at The New York Botanical Garden. A complete program may be had on request.

Lectures

G. L. Wittrock served as a member of the panel on a Sunday evening program, November 12, of the Garden Department of the Bronxville Women's Club, an affiliate of The New York Botanical Garden. Dr. H. N. Moldenke has given the following lectures: "Plants of the Bible" to the Rye Garden Club, a garden club affiliate, on November 15; "Poisonous Plants of the World" to the Advanced Study class at the New York University School of Medicine on November 21; on "Plants of the Bible" to the Federal Plant Quarantine Club of New York on December 1; "The Land of Manana" to the Elizabeth Garden Club on December 6. Dr. P. P. Pirone addressed the Bedford Garden Club, a garden club affiliate, on December 12 at the Bedford Hills Community House. Local residents were invited by the club to attend the meeting because of the importance of his subject — "Care of Storm Damaged Trees."

Students use Conservatory

Students from the Parson School of Design sketched in the conservatory of The New York Botanical Garden on two occasions recently.

Visitors

Mr. Philip Vaudrin, editor of the Oxford University Press, New York City, and Dr. Currier McEwen, Dean of the New York Medical College, were guests of Dr. P. P. Pirone, Plant Pathologist, in December. Dr. and Mrs. Albert Soriano, of Buenos Aires, Argentina, called on Dr. H. N. Moldenke on November 30, and on December 5, Dr. Moldenke received a visit from Dr. Carlos Munoz Pizarro, of the Department of Agriculture and Natural History Museum of Santiago, Chile. Henry Imshaug, of the University of Michigan, visited The New York Botanical Garden for the past six weeks, working in the lichen herbarium, and Dr. A. K. Nyabongo of Brooklyn, N. Y., is making use of the facilities of the library in preparation for a book on the plant lore of Uganda.

Two interested visitors at the November Members' Day were Mr. and Mrs. Fabio Kowarich, whom Park Commissioner Robert Moses sent to the meeting. Mrs. Kowarich is a daughter of Henrique Dumont Villares, one of the leading citizens of Sao Paulo, Brazil, and deeply interested in civic affairs and in the museums and botanical garden of Sao Paulo.

Sir Joseph Banks

(*Continued from page* 25)

1829, at the age of 86 at his Spring Grove house, Isleworth. His vast scientific library and his great collection of botanical specimens he bequathed to the British Museum.

He remained youthful in spirit, conservative in management, progressive in ideas. He was mindful of tradition, yet unafraid to pioneer. He was resourceful in meeting the needs of those interested in science who were less fortunate than he, financially and socially. He was the greatest patron of Australian exploration and colonization and worthy of the affectionate title, "Father of Australia".

Bulls Island

(*Continued from page* 13)

"Leaflets" and stem extend from rim to rim. The "leaf" on its concave side is considerably smaller and appears as though etched in great detail. This too has five "leaflets" and at the apex of four of the "leaflets" and where normally there is a stem are slots varying in size according to the size of the shell, on an average about ¼ inch long and ⅛ inch wide.

While I was primarily interested in the bird life to be found there, from even my short stay on the Island, I am certain that not only the ornithologist but the botanist or those interested in nature study will find the Island a worth while place to visit.

In closing, my sincere thanks to the gentlemen who made the Bulls Island refuge possible. The Domenick Brothers, of Greenwich, Conn., not only turned the Island over to the U. S. Fish & Wildlife Service, but also their beautiful mansion that makes it possible for visitors to obtain food and shelter, should they wish to make an extended stay on the Island. Joseph Moffat is manager of the refuge and the inn.

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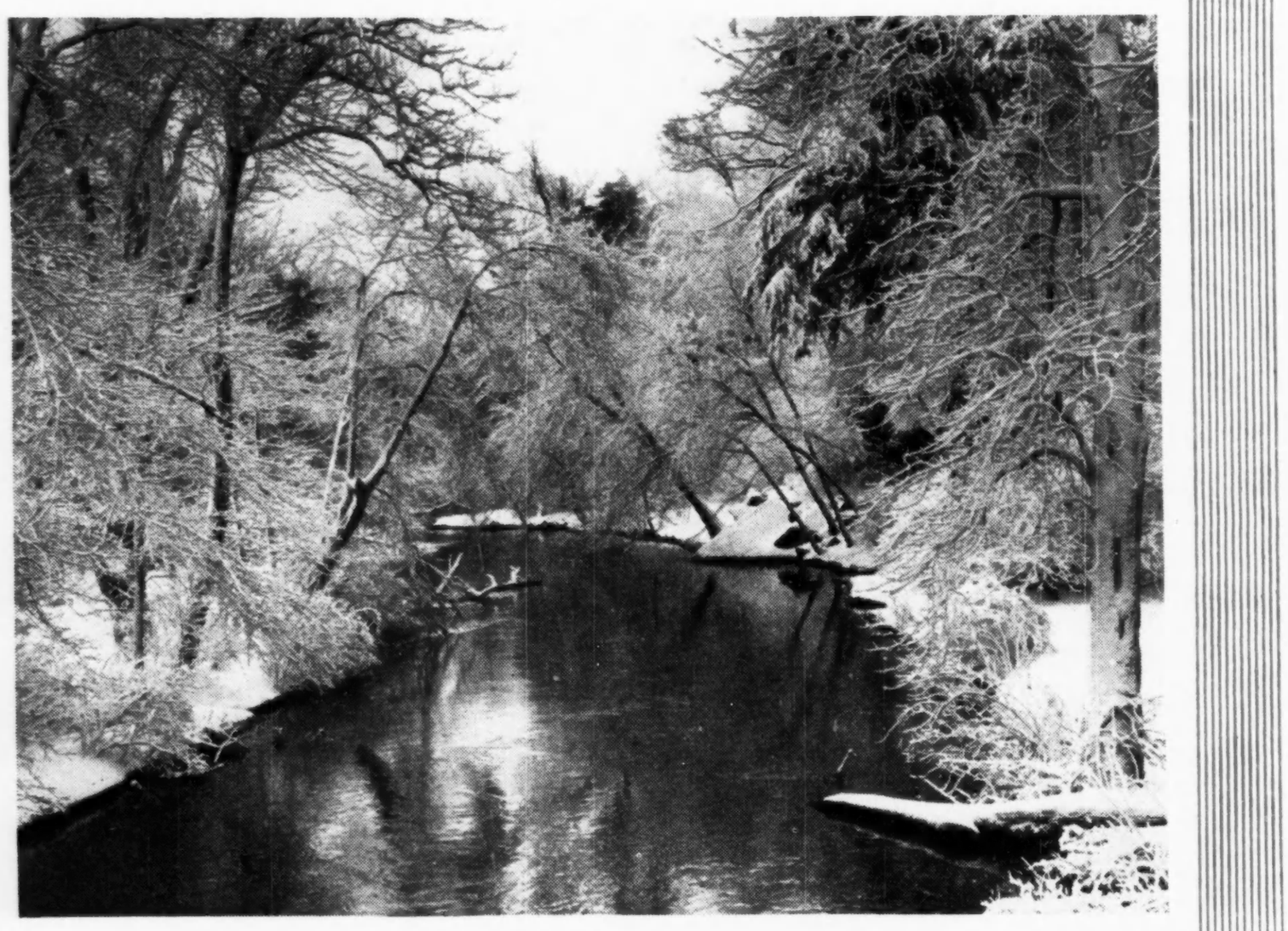
To reach the Botanical Garden, take the Independent Subway to Bedford Park Boulevard station, use the Bedford Park Boulevard exit and walk eats. Or take the Third Avenue Elevated to the Botanical Garden or the 200th Street station; the New York Central to the Botanical Garden station; or the Webster Avenue bus No. 41 to Bedford Park Boulevard.